U.S. Department of the Interior
Bureau of Land Management

Final Environmental Assessment
DOI-BLM-NV-B000-2015-0001-EA
DATE: January 2015

June 2015 Competitive Oil and Gas Lease Sale, Battle Mountain District, Nevada
ENVIRONMENTAL ASSESSMENT

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1.0 INTRODUCTION

1.1 Background

It is the policy of the Bureau of Land Management (BLM) as mandated by various laws,

including the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976, to make mineral resources available and to encourage development of mineral resources to meet national, regional and local needs.

The BLM-Nevada State Office (NVSO) conducts competitive sales for oil and gas lease parcels in the Battle Mountain District. The NVSO publishes a Notice of Competitive Lease Sale (NCLS) that lists lease parcels offered at the auction at least 90 days before it is held. The BLM bases its decision as to which parcels to offer for a competitive lease sale on current resource and land use information and the management framework developed in the appropriate district or field office Resource Management Plans (RMPs).

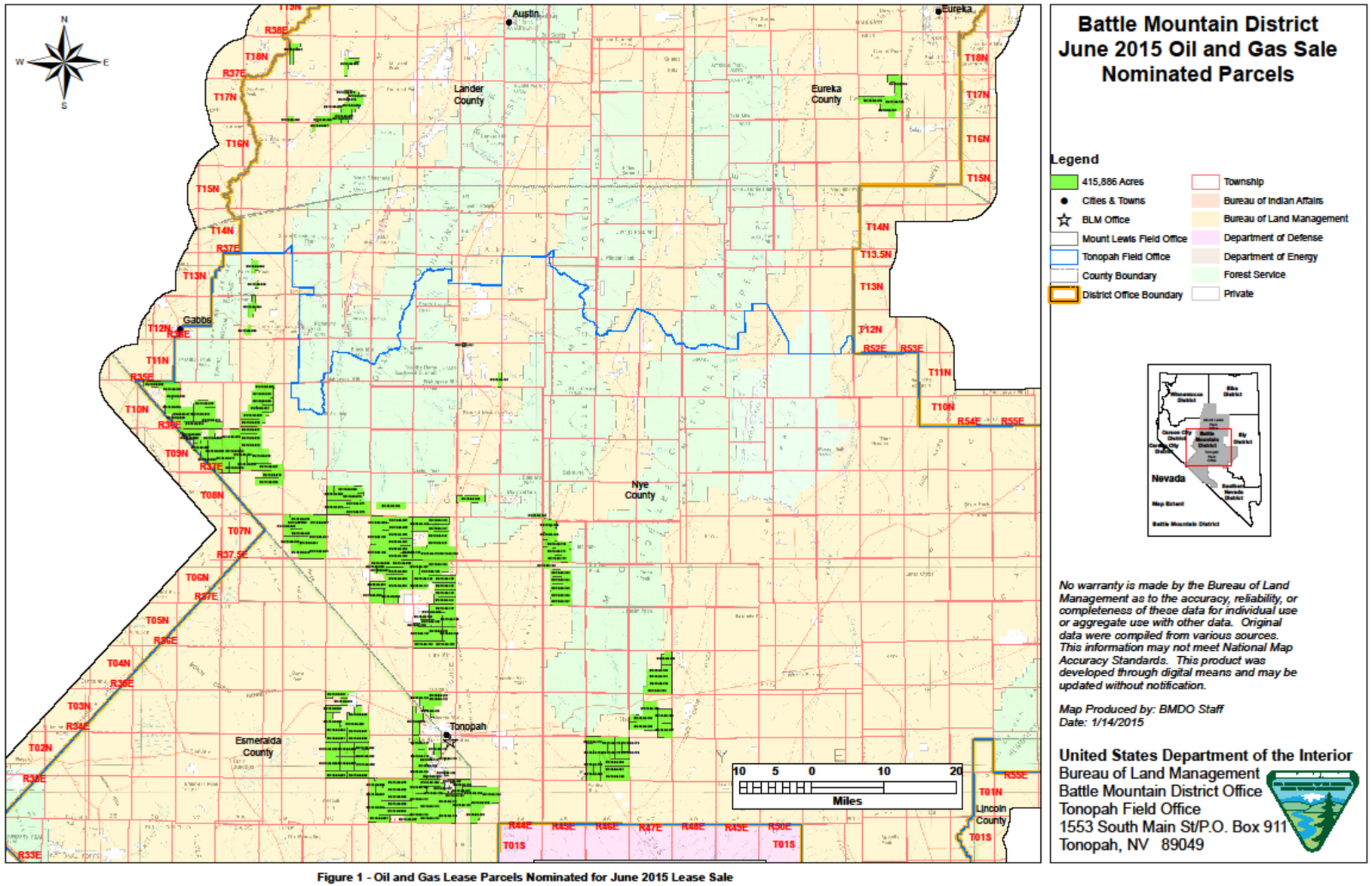
In the process of preparing a lease sale, the NVSO sends a list of nominated parcels to each field office where the parcels are located. As part of the Environmental Assessment (EA) analysis, the field office staff then reviews the parcels to determine:

- If they are in areas open to leasing;
- If new information has become available which might change any analysis conducted during the planning process;
- If appropriate consultations have been conducted;
- What appropriate stipulations should be included; and
- If there are special resource conditions of which potential bidders should be made aware.

Based on the analysis in the EA, the Nevada BLM State Director would make a decision on which parcels to make available for leasing and which stipulations to attach to the parcels. Those parcels and stipulations that are included in the State Director's decision would then be made available to the public through a NCLS. Lease stipulations applicable to each parcel are specified in the Sale Notice. Occasionally, additional information obtained after the publication of the NCLS, may result in withdrawal of certain parcels prior to the day of the lease sale.

This EA documents the review and environmental analysis of 197 Battle Mountain District Office (BMDO) administered parcels nominated in the June 2015 Competitive Oil and Gas Lease Sale (Figure 1). The EA verifies conformance with the approved Land Use Plan, provides the rationale for any lease stipulations applied to specific parcels and identifies parcels proposed for deferral.

An assessment of potential environmental impacts, based on a Reasonably Foreseeable Development (RFD) scenario, was conducted by resource specialists who relied on historical data and personal knowledge of the areas involved, conducted field inspections and/or reviewed existing databases and file information to determine the appropriate stipulations to attach to specific parcels.



Battle Mountain District
June 2015 Oil and Gas Sale
Nominated Parcels

Legend

415,886 Acres	Township
Cities & Towns	Bureau of Indian Affairs
BLM Office	Bureau of Land Management
Mount Lewis Field Office	Department of Defense
Tonopah Field Office	Department of Energy
County Boundary	Forest Service
District Office Boundary	Private

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Map Produced by: BMDO Staff
Date: 1/14/2015

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Battle Mountain District Office
Tonopah Field Office
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Figure 1 - Oil and Gas Lease Parcels Nominated for June 2015 Lease Sale

At the time of this review, it is not known whether the nominated parcels would receive bids, if leases would be issued, or what types of lease operations might be proposed in the future. Detailed site-specific NEPA analysis would occur when an Application for Permit to Drill (APD) is submitted.

1.2 Purpose and Need for Action

Oil and gas leasing is necessary to provide oil and gas companies with new areas to explore and potentially develop. Leasing is authorized under the Mineral Leasing Act of 1920, as amended and modified by subsequent legislation, and regulations found at 43 CFR part 3100. Oil and gas leasing is recognized as an acceptable use of the public lands under the Federal Land Policy and Management Act of 1976 (FLPMA). BLM authority for leasing public mineral estate for the development of energy resources, including oil and gas, is listed in 43 CFR 3160.0-3.

Offering parcels for competitive oil and gas leasing provides for the orderly development of fluid mineral resources under BLM's jurisdiction in a manner consistent with multiple use management and consideration for the natural and cultural resources that may be present. This requires that adequate provisions are included with the leases to protect public health and safety and assure full compliance with the spirit and objectives of the National Environmental Policy Act (NEPA) and other federal environmental laws and regulations. This action is being initiated to facilitate the BMD implementation of the requirements in Executive Order (EO) 13212 (2001) and the National Energy Policy Act (2005).

The BLM is required by law to consider leasing of areas that have been nominated for lease if leasing is in conformance with the BLM land use plan. The oil and gas parcels addressed in this EA cannot be considered for leasing without supplemental analysis of changes in environmental conditions that have occurred since the completion of the current Land Use Plan (LUP) (e.g., increased growth, locations of special status species, identification of traditional cultural properties).

The BMD must determine whether or not to recommend leasing all or part of the nominated parcels in the upcoming June 2015 Competitive O&G Lease Sale to the Nevada BLM State Director by March 2, 2015. If there are known resource conflicts that cannot be addressed using a stipulation, then the parcel may be deferred. As a result, the BMD must determine which stipulations must be attached to the parcels in order to protect natural resources.

1.3 Land Use Plan Conformance

The Proposed Action is in conformance with the Tonopah RMP, approved on October 6, 1997, for the Tonopah Assessment area and the Shoshone Eureka RMP and associated Record of Decision (1986). The Proposed Action is in conformance with the Tonopah RMP because it is specifically provided for in the following LUP objective:

> Page 22 of the RMP, under the heading "Fluid Minerals" subtitled "Objective": "*To provide opportunity for exploration and development of fluid minerals such as oil, gas, and geothermal resources, using appropriate stipulations to allow for the preservation and enhancement of fragile and unique resources"*.

The Proposed Action also in conformance with the Tonopah RMP because it has been determined that the lease parcels are a subset of:

> *"[The] total of 5,360,477 acres (88% of the Tonopah Assessment area)[that] is open to fluid minerals leasing subject to standard terms and conditions (p.22)."*

The Proposed Action is also in conformance with the Shoshone-Eureka RMP Part II, Section E, Management Actions Not Expressly Addressed by the Resource Management Plan, which includes Minerals Objectives and Management Decisions brought forward unaltered from the Management Framework Plan (Record of Decision p. 29). Minerals Objectives 1, 2 and 3 led to Management Decisions 1 through 5 for leasable minerals (oil and gas). The objectives are as follows:

> Objective 1: Make available and encourage development of mineral resources to meet national, regional and local needs consistent with national objectives for an adequate supply of minerals.
>
> Objective 2: Assure that mineral exploration, development and extraction are carried out in such a way as to minimize environmental and other resource damage and to provide, where legally possible, for the rehabilitation of lands.
>
> Objective 3: Develop detailed mineral resource data in areas where different resources conflict so that informed decisions may be made that result in optimum use of the lands.

Management Decision #4, specifically addresses oil and gas leasing and states, "All areas designated by the BLM as prospectively valuable for oil and gas will be open to leasing except as modified by other resources."

1.4 Relationship to Statutes, Regulations, Policy, Plans and Other Environmental Analysis

Purchasers of oil and gas leases are required to abide by all applicable federal, state and local laws and regulations. This includes obtaining all required permits should lease development occur. Federal regulations and policies require the BLM to make public land and resources available based on the principle of multiple use. At the same time, it is BLM policy to conserve special status species and their habitats and ensure that actions authorized by the BLM do not contribute to the need for the species to become listed as threatened or endangered by the United States Fish and Wildlife Service (USFWS).

The BLM must adhere to Section 106 of National Historic Preservation Act (NHPA). The BLM also must comply with Nevada State Historical Preservation Office (SHPO) protocol agreement, which is authorized by the National Programmatic Agreement between the *BLM*, the *Advisory Council on Historic Preservation* and the *National Conference of State Historic Preservation Officers.* All activities will be subject, but not limited to: Executive Order 11990 *Protection of Wetlands*, Executive Order 11988 *Protection of Floodplains,* the Clean Water Act, the Safe Drinking Water Act, the Onshore Oil and Gas Orders, Wild Free Roaming Horse and Burro Act, Endangered Species Act, Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

The Proposed Action and alternatives are in conformance with the National Environmental Policy Act (NEPA) of 1969, (P.L. 91-190 as amended (42 USC §4321 et seq.); Mineral Leasing Act (MLA) of 1920 as amended and supplemented (30 USC 181 et seq.); the Federal Oil and Gas

Leasing Reform Act of 1987, which includes the regulatory authority under 43 Code of Federal Regulations (CFR) Part 3100, Onshore Oil and Gas Leasing, 43 CFR Part 3160, Onshore Oil and Gas Operations and Title V of the Federal Land Policy and Management Act of 1976 (FLPMA) Right-of-Way (ROW) under regulatory authority under 43 CFR Part 2800 for ROWs.

1.5 Scoping and Public Involvement

The BMDO interdisciplinary team participated in internal scoping meetings on November 19, 2014. During the scoping meeting, specific parcels were evaluated for deferral based on resource concerns and land use conflicts. Additionally, interested public letters were sent to the BMD mailing list outlining that the preliminary nominated parcel list, along with a map of nominated parcels, was available for review at the BLM National ePlanning website, for a 15-day scoping period which ended December 24, 2014. The BLM issued a press release the same day providing a link to the documents and instructions on how to comment. A total of five scoping comments were received. Please refer to Figure 2 for a map of the BMD June 2015 Oil and Gas Sale Offered Parcels. The list of parcels recommended for deferral can be found in Appendix C.

Native American consultation letters for the June 2015 Lease Sale were sent on November 13, 2014. They were sent to the South Fork Band of the Western Shoshone, Duckwater Shoshone Tribe, Yomba Shoshone Tribe, Timbisha Shoshone Tribe, Fallon Paiute-Shoshone Tribe, and Walker River Paiute Tribe . On November 25, 2014, Juan Martinez, Battle Mountain District Native American Coordinator (NAC), met with a representative of the Duckwater Shoshone Tribe. At that meeting, they did not identify or request to defer any parcels but asked to be contacted if APDs are submitted for any of the parcels.

On December 29, 2014 BLM also received a letter from the Yomba Shoshone Tribe. Tim Coward, Tonopah Field Manager and Juan Martinez (NAC) attended the Regular Council meeting on Jan. 09, 2015. The council shared concerns with the proposed oil and gas lease sale and a grazing permit held by members of the Yomba tribe. The BLM explained the lease process and informed the tribe that if APDs were received within that the grazing permittee's allotment, the permittee would be notified. The BLM informed the tribe that several of the parcels that they had concerns with have been proposed for deferral.

Nevada Department of Wildlife (NDOW) responded to the scoping letter with a formal comment letter that was received by the BMD on December 19, 2014.

Only NDOW provided comments which recommended parcels for deferral or timing stipulations for wildlife. Commenters expressed concerns with regard to potential impacts to water usage, hydraulic fracturing, potential ground and surface water contamination and wildlife impacts associated with potential exploration and development activities.

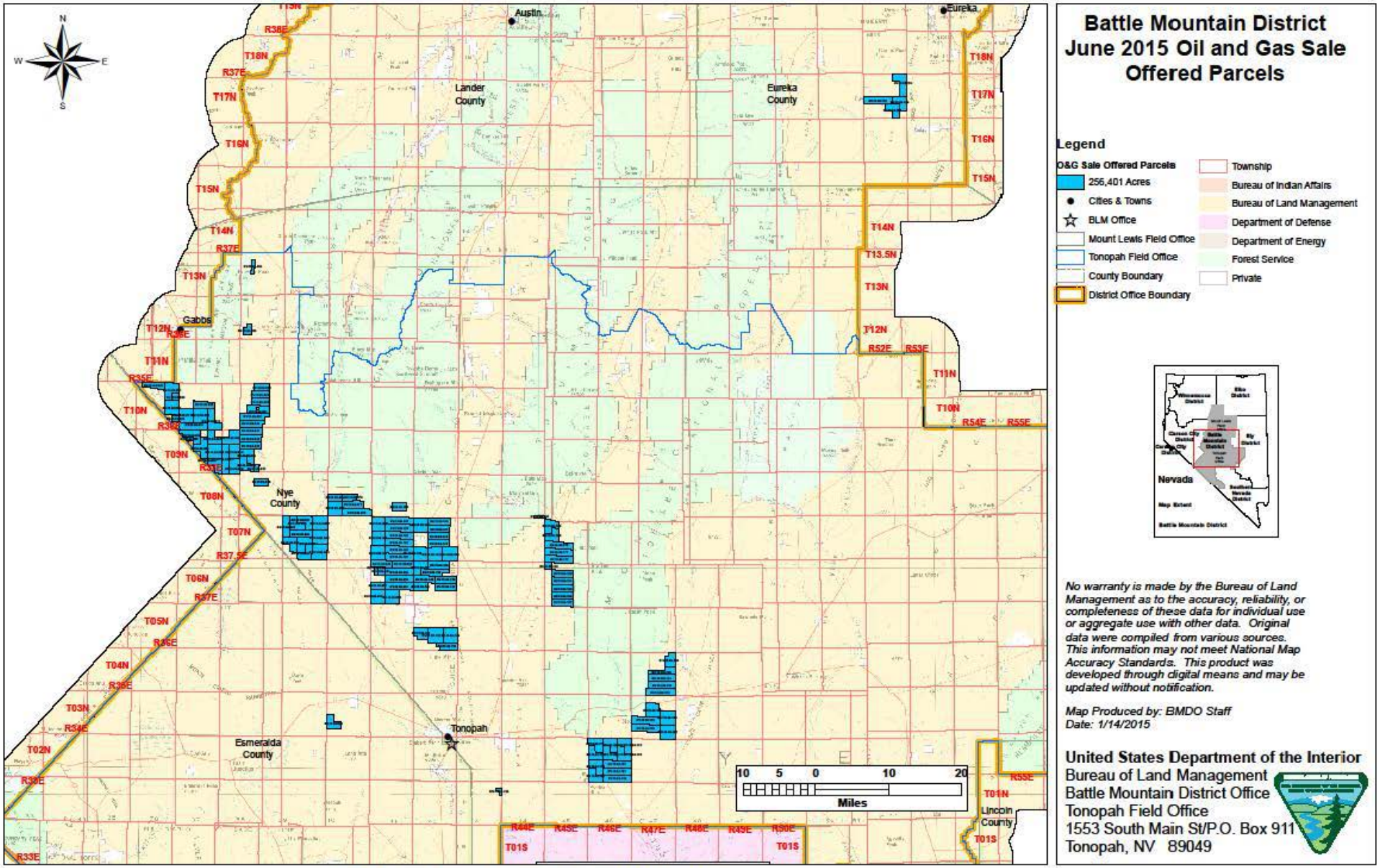

Figure 2 - Oil and Gas Lease Parcels Offered for June 2015 Lease Sale

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The Proposed Action is to offer for competitive sale 124 of the 197 nominated parcels that were sent to the BMDO for review. The acreage nominated for leasing was 415,886 acres and the acreage to be offered is 256,401 acres. Seventy-three parcels have been proposed for complete deferral due to natural resource concerns and land use conflicts. Thirteen parcels have been proposed for partial deferral for these same reasons. The 86 proposed complete or partial parcels comprise 159,485 acres or approximately 38 percent of the original total. The specific parcels and reasons for proposed deferral may be found in Appendix C.

Oil and gas leases are issued for a 10-year period and continue for as long thereafter as oil or gas is produced in paying quantities. If a lessee fails to produce oil and gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease; ownership of the minerals revert back to the federal government and the lease can be resold. The stipulations and notices that would be attached to the offered leases may be found in Appendix B.

2.2 No Action Alternative

In accordance with BLM National Environmental Policy Act (NEPA) guidelines H-1790-1, Chapter 6, this EA evaluates the No Action Alternative. The objective of the No Action Alternative is to describe the environmental consequences that would result if the Proposed Action were not implemented. The No Action Alternative forms the baseline from which the impacts of all other alternatives can be measured. In the case of a lease sale, this would mean that all expressions of interest to lease (parcel nominations) would be denied or rejected.

Under the No Action Alternative, the BLM would withdraw all 197 lease parcels from the June 2015 lease sale. Surface management would remain the same and ongoing oil and gas development would only continue on previously leased federal, private and state lands.

2.3 Alternatives Considered but Eliminated from Further Analysis

The BMDO staff considered leasing all 197 parcels that were nominated for leasing. However, during scoping, it was determined that there were specific resource and land use conflicts that would require proposing deferral of specific parcels. This Alternative has been eliminated from further analysis. As outlined above, of the 197 parcels nominated, 73 have been proposed for deferral and 13 parcels have been proposed for partial deferral. Rational for proposed parcel deferment may be found in Appendix C. Additionally, as a result of public scoping that was conducted in December 2014 (nominated parcels were available for public comment from 12/9/2014-12/24/2014), no other reasonable alternatives were developed.

2.4 Reasonably Foreseeable Development (RFD) Scenario

2.4.1 Trends and Projections for Oil and Gas Exploration in the BMD

Oil production data from the Nevada Bureau of Mines and Minerals (Figure 3) show that oil and gas production in the state has fallen off since the early 1990s and has flattened out at less than 500,000 barrels per year over the last several years.

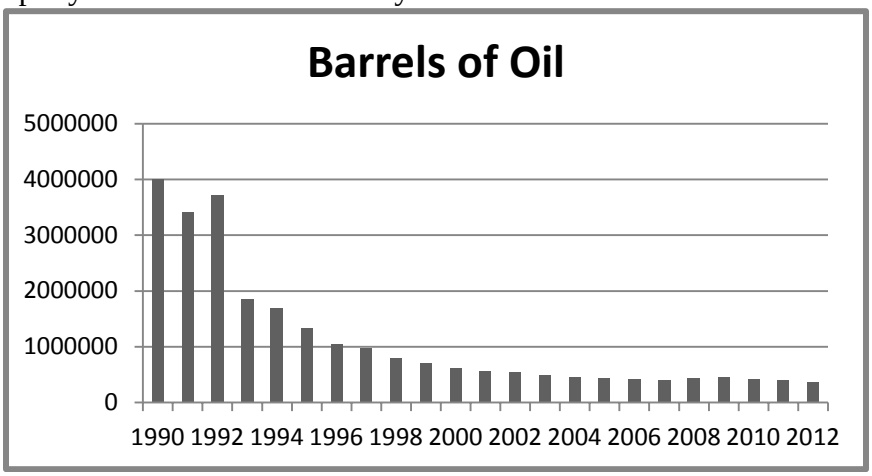

Figure 3. Oil production trends in Nevada from1990 through 2012.

As part of the 1997 Tonopah RMP, the BLM conducted a RFD scenario for oil and gas exploration and development. The RFD projected that 30 wildcat wells would be drilled through the year 2014 for a total disturbance of 296 acres. It also projected a number of additional production wells in established oil fields and estimated a total future surface disturbance of 131 acres. The 1997 RFD also projected the development of two additional oil fields with a total future disturbance of 944 acres.

The actual number of exploration wells approved within the Tonopah Field Office (TFO) during the 1997-2014 RMP RFD projected time period totaled 15 with none of these becoming production wells. Additionally, there were no new oil fields developed within the TFO between 1997 and 2014. The average amount of surface disturbance associated with the exploration wells (sumps, road construction, pads, etc.) was approximately 3.3 acres per well for an overall disturbance of approximately 50 acres. Compared to the actual amount of activity, the oil and gas RFD for the 1997 Tonopah RMP overestimated the amount of exploration and production activity and associated surface disturbance. This was a conservative approach, as it was impossible to predict with certainty how resource development would occur in the future.

The interaction of prices, markets, technology, environmental concerns, and viability of the potential oil and gas resource in the Project area all play a role in estimating future surface disturbance related to oil and gas exploration/production. Based on past history and considering advancements in drilling and well stimulation techniques, it would be highly speculative to assume that production wells and additional oil fields would be developed within the TFO.

This assessment provides a clear basis for estimating a low development potential for oil and gas disturbance that might indirectly result from the June oil and gas lease sale. Conservatively,

based on historic information and anticipated activity, over the next ten years, approximately 20 exploration wells with approximately 50-75 acres (20 X 3.3 ac. = 66 ac.) of associated surface disturbance could be expected to occur in the TFO, where the majority of the proposed sale parcels would be located. Considering that the total number of acres in this lease sale for the TFO, the total amount of disturbance could be expected to be less than one percent of the proposed lease sale area (approximately 66 ac./256,401 ac. = .026%)

A relatively small number of the proposed lease sale parcels (four parcels totaling approximately 8,941 acres) would be located in the Mount Lewis Field Office (MLFO) area. According to the 2006 *Environmental Assessment for Oil and Gas Leasing within Portions of the Shoshone-Eureka Assessment area and 2008 Environmental Assessment Oil and Gas Leasing Within the Western Portion of the Shoshone-Eureka Assessment area*, the overall potential for oil and gas exploration and development in this area is also low. The western portion of the assessment area was considered to have a lower potential when compared to that of the eastern portion. The eastern portion of the Shoshone-Eureka assessment area was considered to have moderate potential because it is located on a strike between Pine Valley and Railroad Valley, the two major production areas in the State. In addition, the geologic setting is similar. The RFDs for these environmental assessments estimated a total surface disturbance associated with oil and gas exploration/production of approximately 680 acres for the entire MLFO assessment area (4.5 million acres). Compared to actual acres of disturbance associated with oil and gas exploration/production within the MLFO during the projected period described below, the RFD overestimated the amount of surface disturbance.

While oil and gas interest has increased over the last 25 years in the MLFO area, very few exploratory wells have been drilled; an average of less than one exploration well was drilled per year between the years of 1980 and 2003. Exploration interest since this time has focused on the eastern portion of the MLFO area, specifically in Eureka County, which is consistent with the geologic potential of the area. Since 2003, there have only been four exploration wells approved on the MLFO and there have not been any wells drilled in the MLFO in the last eight years. Like the TFO area and as reflected in the actual amount of oil and gas activity, the potential for oil and gas exploration and production in the MLFO can also be considered very low. Conservatively, over the next ten years, based on previous and anticipated activity and interest, about 5 exploration wells and 15-25 acres of surface disturbance associated with oil and gas exploration/production activity could be expected to occur in the MLFO.

Conservatively, based on historic information and anticipated activity, over the next ten years, approximately 50-100 acres of surface disturbance associated with potential oil and gas exploration and production activities could be expected to occur in the BMD.

2.4.2 **Typical Oil and Gas Exploration and Development Activities**

Despite the low predicted potential of the proposed lease parcels, at any point during the 10-year term of the lease, the lessee, or operator may submit specific plans for some level of proposed development. Typical oil and gas development operations occur in phases, each of which occurs in a more or less predictable sequence that is contingent on the success or failure of the previous phase.

Geophysical Exploration

Geophysical exploration is used to obtain detailed geologic information. A variety of exploration methods are employed, ranging from placing electrodes in the ground, to detonating explosives to create shockwaves, to employing specially constructed off-road vehicles to produce vibrations. The most commonly used method in eastern Nevada is the vibroseis technique, which uses large off-road vehicles with "thumpers" to generate shockwaves for two or three dimensional surveys.

Exploration Drilling

Exploratory drilling (a wildcat well) begins development of a lease. An APD is filed with the BLM. A field examination is conducted and NEPA review is completed before a drilling permit is issued. An access road and a well pad are constructed for each well, if needed. Total disturbance attributed to drilling an exploration well is usually limited to less than ten acres for the pad and access road. Statistically, over 95% of exploration wells are dry.

Well Stimulation and Hydraulic Fracturing (HF)

Well Stimulation may be used to enhance oil recovery. Several methods of well stimulation could be used. HF is one of these methods that may be reasonably foreseeable for leases proposed for sale. HF is the process of applying high pressure fluid to a subsurface formation via a wellbore, to the extent that the pressure induces fractures in the rock. Typically, the induced fractures would be propped open with a granular "proppant" to enhance fluid connection between the well and formation. The process was developed experimentally in 1947 and has been used routinely since 1950. The Society of Petroleum Engineers (SPE) estimates that over one million HF procedures have been conducted in the United States and tens of thousands of horizontal wells have been drilled and hydraulically fractured. The process can increase the yield of a well and development of HF methods and the drilling technology in which it is applied (in particular, long wells drilled horizontally within zones of interest) have enabled production of oil and gas from tight formations formerly not economically feasible.

HF procedures for mitigating potential environmental impacts may include:

- Wells are cased multiple times and sealed with cement between the wellbore and the formation. Well integrity is tested throughout the process.

- Drilling and HF fluids are either contained in a pitless system (above ground tanks) or a lined pit. Cuttings could be contained in roll-off boxes for hauling to disposal or surface casing interval cuttings could be spread over the site during reclamation.

- HF fluids are recovered to a large degree in "flowback" or produced water when the well is tested or produced.

- All recovered fluids are generally handled by one of four methods:
    - Underground injection;
    - Captured in steel tanks and disposed of in an approved disposal facility;
    - Treatment and reuse; and
    - Surface disposal pits

- Drilling cuttings could be land farmed and buried on site 3 feet below root zones. Any cuttings that do not fit this waste profile will be disposed of at an approved disposal facility.

For a more in depth look at HF procedures, potential impacts, and risks, please refer to the "Hydraulic Fracturing White Paper" (Appendix E).

In-Field Drilling

In-field drilling of additional exploration wells typically occurs in order to define the limits of the oil or gas reservoir when initial drilling has located oil or gas. The process of in-field drilling is the same as that employed for initial exploratory drilling, although new roads and pads may not be required in every instance.

Production

Production only occurs if oil or gas can be transported to a market and sold at a profit. n the Battle Mountain District, pumped oil is generally piped a short distance for temporary storage, then trucked to a refinery for processing. This basic method of transport is not likely to change because of the small quantity of resource estimated to be present in the Battle Mountain District. Production facilities may include one or more of the following: a well head; pumping equipment; a separation system; pipelines; a metering system; storage facilities; water treatment and injection facilities; cathodic protection systems; electrical distribution lines; compressor stations; communication sites; roads; salt water disposal systems; dehydration sites; and fresh and salt water plant sites.

Well Abandonment

Well abandonment may be temporary or permanent. Wells are sometimes shut-in because pipelines or roads needed for production and marketing don't exist and the cost for construction is not justified by the quantity of oil discovered. These wells may later be reentered when their production can be marketed. The permanent abandonment of a well occurs when the well is determined to no longer have a potential for economic production, or when the well cannot be used for other purposes.

Reclamation

Reclamation includes removal of facilities and reclamation of surface disturbance. In the case of a producing well, reclamation would be done after production has ceased. In the case of exploration wells which do not find economically recoverable amounts of oil, initial reclamation (re-contouring), is usually completed the following year which provides for sufficient time for the reserve pit to dry out. After re-vegetation of the site is completed, usually within two to three years, reclamation is complete.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the existing condition of natural and cultural resources in the lease sale

area and presents an impact analysis which predicts how these resources might be affected by the implementation of the Proposed Action.

3.1 Supplemental Authorities to be Considered

To comply with the NEPA, the Bureau of Land Management is required to address specific elements of the environment that are subject to requirements specified in statute, regulation or by executive order (BLM 1988, BLM 1997, BLM 2008). The following table (Table 1) outlines the elements that must be addressed in all environmental analyses, as well as other resources deemed appropriate for evaluation.

Supplemental Authority	Not Present	Present/Not Affected	Present/May be Affected	Rationale
Air Quality			√	See discussions in Sections 3.4.1 and 4.3.1.
Area of Critical Environmental Concern (ACEC)	√			The proposed lease parcels are not located in or near any ACECs.
Cultural/Historical			√	See discussions in Sections 3.4.2 and 4.3.2.
Environmental Justice	√			Based on a review of existing data, no minority or low-income groups would be disproportionately affected by health or environmental effects of implementing the proposed action. This element is not further analyzed in this EA.
Farmlands Prime or Unique	√			There are no Prime or Unique Farmlands in the Battle Mountain District.
Noxious Weeds/Invasive Non-native Species			√	See discussion in Sections 3.4.7 and 4.3.7.
Native American Cultural Concerns			√	See discussion in Sections 3.4.3 and 4.3.3.
Floodplains			√	See discussion in Section 3.4.5 and 4.3.5.
Riparian/Wetlands/			√	See discussion in Sections 3.4.5 and 4.3.5.
Threatened, Endangered Species			√	See discussion in Sections 3.4.4 and 4.3.4.
Migratory Birds			√	See discussion in Sections 3.4.4 and 4.3.4.
Waste – Hazardous/Solid			√	See discussion in Sections 3.4.6 and 4.3.6.
Water Quality			√	See discussion in Sections 3.4.5 and 4.3.5.

Supplemental Authority	Not Present	Present/Not Affected	Present/May be Affected	Rationale
Wild & Scenic Rivers	√			The proposed parcels are not located in or near any wild and scenic rivers.
Wilderness	√			None of the proposed parcels are within or near a Wilderness Study Area (WSA) and WSAs are not affected by the proposed lease parcels.
Forests and Rangelands (HFRA only)	√			This is not a Healthy Forest Restoration Act (HFRA) related proposal, thus the HFRA does not apply.

Table 1. Supplemental Authorities Considered in the EA.

3.2 Other Resources

Other resources that have been considered for this environmental assessment (EA) are listed in Table 2 below. Elements that may be affected are further described in the EA. For those resources that would not be affected, rationale is provided.

Other Resources	Not Present	Present/Not Affected	Present/May be Affected	Rationale
Fire Management	√			The Proposed Action is limited to leasing and there is no authorized ground disturbing activity associated with the lease. Standard fire management stipulations would be included in any lease sale. Any potential impacts from subsequent exploration and development activities would be analyzed under a separate, site specific analysis.
Forestry			√	See discussion in Sections 3.4.17 and 4.3.17
Grazing Management			√	See discussion in Sections 4.4.11 and 4.3.11.
Land Use Authorization			√	See discussion in Sections 3.4.12 and 4.3.12.
Minerals			√	See discussion in Sections 3.4.8 and 4.3.8.
Paleontological Resources			√	See discussion in Sections 3.4.2 and 4.3.2
Recreation			√	See discussion in Sections 3.4.14 and 4.3.14.
Socio-Economic Values			√	See discussion in Sections 3.4.15 and 4.3.15.
Soils			√	See discussion in Sections 3.4.9 and 4.3.9
Special Status Species			√	See discussion in Sections 3.4.4 and 4.3.4
Vegetation			√	See discussion in Sections 3.4.10 and 4.3.10.
Visual Resources			√	See discussion in Sections 3.4.13 and 4.3.13

Other Resources	Not Present	Present/Not Affected	Present/May be Affected	Rationale
Wild Horses and Burros			√	See discussion in Section 3.4.16 and 4.3.16.
Wildlife			√	See discussion in Sections 3.4.4 and 4.3.4.

Table 2. Other Resources Considered in the EA.

3.3 Environmental Impacts of No Action Alternative

Under the No Action alternative, the proposed lease parcels would not be sold. This means that no on-the-ground actions would occur (geophysical exploration, exploration drilling, etc.) that would have the potential to impact resources. Surface management would remain the same and ongoing oil and gas development would only continue on previously leased federal, private and state lands. The indirect impacts from the No Action Alternative would be similar to those described in the Proposed Action within areas that have already been leased. The No Action alternative will not be carried forward for each resource in this EA. Since there would not be additional potential impacts to resources under the No Action alternative, it is not considered further in the EA.

3.4 Impacts Requiring Further Analysis

Through internal scoping, the following resources have been determined to be present and potentially affected by the Proposed Action: air quality, cultural resources, noxious weeds, wetlands/riparian zones, forestry, minerals, soils, migratory birds, water quality/hydrology, vegetation, wild horses and burros, visual resource management, wastes (hazardous and solid), threatened and endangered species, special status species, Native American concerns, wildlife, range resources, lands and realty, recreation and socioeconomics. The effects of the Proposed Action on these resources will be brought forth for further analysis.

There would be no direct impacts (i.e., impacts that would occur during the implementation of the Proposed Action) from issuing new oil and gas leases because leasing does not directly authorize oil exploration and development activities. However, if a lease is sold, the lessee retains certain irrevocable rights. For example, according to 43 CFR § 3101.1-2, once a lease is issued to its owner, that owner has the *"right to use as much of the lease lands as is necessary to explore for, drill for, mine, extract, remove and dispose of the leased resource in the leasehold"* subject to specific nondiscretionary statutes and lease stipulations.

If an Application of a Permit to Drill (APD) is received for a purchased parcel, a separate, site-specific NEPA analysis would be required to disclose any potential environmental impacts to resources on public lands. Potential impacts may be caused by any or all of the oil and gas exploration and development activities described in Section 3.4. The reader should note that in the following sections only indirect impacts (i.e., impacts that occur at some point after the implementation of the Proposed Action) are considered.

The term “mitigation” used in the following sections refers to resource protection measures that could be employed when actual leases are developed subsequent to the lease sale.

3.4.1 Air Quality

Affected Environment

Climate and Meteorology

The State of Nevada is largely a plateau on the eastern side of the Sierra Nevada mountain range. The Assessment area is in south-central Nevada and has elevations ranging from 4,500 to 11,000 feet above mean sea level (amsl). The highest elevations are found in the US Forest Service (USFS)-administered lands of the Humboldt-Toiyabe National Forest. Winds in the Assessment area are predominantly from the west, but southerly or southwesterly winds occur in some areas due to channeling from the local topography. In valleys, winds are generally light in the morning and stronger in the afternoon. Dust storms can occur, especially in the southern part of the Assessment area in the spring, when there is a higher frequency of storms.

When air masses approach from the west, moisture condenses and precipitation falls on the western slope of the Sierra Nevada. As the air masses descend on the eastern slope of the Sierra Nevada, most of the moisture has fallen out, and these areas are typically low in humidity and precipitation. Most of the Assessment area's annual precipitation averages 5 to 10 inches, although precipitation totals are generally higher over the mountainous areas. Precipitation is greatest from November to March in the form of mountain snow, and is lightest in the summer.

Typical summertime temperatures range from around 50 degrees Fahrenheit (°F) at night to near 90°F in the daytime, with cooler temperatures at the higher elevations. In the winter, temperatures are typically in the upper teens at night to near 40°F in the daytime (BLM 2012a).

Air Quality

Regulatory Considerations

The Clean Air Act (CAA; 42 USC, 7401−7642) established the principal framework for national, state, and local efforts to protect air quality in the US. Under the CAA, the US Environmental Protection Agency (EPA) has set time-averaged standards known as national ambient air quality standards (NAAQS) for six air pollutants considered to be key indicators of air quality: carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, and two categories of particulate matter (particulate matter with an aerodynamic diameter of 10 microns or less [PM_{10}] and particulate matter with an aerodynamic diameter of 2.5 microns or less [$PM_{2.5}$]). States may set their own ambient air quality standards, but they must be at least as stringent as the national standards. The State of Nevada has adopted most of the national ambient air quality standards to regulate air pollution but has adopted a more stringent carbon monoxide standard for areas higher than 5,000 feet amsl. It also has a more stringent sulfur dioxide standard and a standard for hydrogen sulfide, for which there is no national standard (Nevada Administrative Code 445B.22097).

A NAAQS is composed of two parts: an allowable concentration of a criteria pollutant and an averaging time over which the concentration is measured. Averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposure to a high concentration for a short time or to a lower average concentration over a longer period.

For some pollutants, there is more than one air quality standard, reflecting both short-term and long-term effects. Primary standards set limits to protect public health, including the health of

sensitive populations, such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Criteria air pollutants may have local effects or regional effects or both. Oxides of nitrogen and volatile organic compounds are precursors for producing photochemical smog (ozone) and secondary particulate matter. Ozone (including its precursors), $PM_{2.5}$, and sulfur dioxide are considered regional air pollutants, typically affecting air quality regionally. Such pollutants as carbon monoxide and lead are considered local, typically accumulating close to their emission sources. PM_{10} can be considered both a regional and local air pollutant, depending on the particular circumstance. In addition, long-range transport of nitrogen dioxide, PM_{10}, $PM_{2.5}$, and sulfur dioxide can contribute to regional visibility degradation, as well as atmospheric deposition on sensitive areas, such as national parks and wilderness areas, many miles downwind of individual emission sources.

Ozone, particulate matter (PM_{10} and $PM_{2.5}$), and carbon monoxide are the air pollutants of greatest concern in most parts of the country. Ozone is seldom released directly into the atmosphere but forms from complex chemical reactions that occur in sunlight. The atmospheric chemical reaction processes that produce ozone also produce chemically formed particulate matter and acidic compounds. Combustion processes and evaporation of volatile organic compounds are the major emission sources for organic compounds. Common fuel combustion sources include fuel combustion in motor vehicles, fuel combustion in industrial processes, agricultural burning, prescribed burning, and wildfires. Common evaporative sources of organic compounds include paints, solvents, liquid fuels, or liquid chemicals. Combustion processes are the major source of emissions for nitrogen oxides. Biogenic natural sources are also a source for volatile organic compound emissions.

The major emission source categories for PM_{10} and $PM_{2.5}$ are combustion sources (fuel combustion in motor vehicles and industrial processes, agricultural burning, prescribed burning, and wildfires); industrial grinding and abrasion processes; soil disturbance by construction equipment, agricultural and forestry equipment, recreational vehicles, or other vehicles and equipment; mining and other mineral extraction; and wind erosion from exposed soils and sediments. $PM_{2.5}$ and, to a lesser extent, PM_{10} are also formed by the types of atmospheric chemical reactions that produce ozone and acidic compounds. In Nevada, dust is the greatest contributor of both PM_{10} and $PM_{2.5}$ (EPA 2008).

The major sources of carbon monoxide are combustion processes, such as fuel combustion in motor vehicles, and industrial processes, agricultural burning, prescribed burning, and wildfires.

In addition to criteria pollutants, the CAA regulates 187 hazardous air pollutants under the National Emissions Standards for Hazardous Air Pollutants program. Hazardous air pollutants are those pollutants known or suspected to cause cancer or other serious health effects or adverse environmental impacts. The EPA has issued rules covering 80 categories of major industrial sources, as well as categories of smaller sources. Controls are usually required at the source to limit the release of these air toxics into the atmosphere.

Section 176(c) of the CAA requires that federal actions conform to the appropriate state implementation plan. This is a plan developed at the state level that provides for the implementation, maintenance, and enforcement of NAAQS, and it is enforced by the EPA. The EPA has promulgated rules establishing conformity analysis procedures for transportation-related actions and for other general federal agency actions (40 CFR, Parts 6, 51, and 9. The EPA general conformity rule requires preparation of a formal conformity determination document for federal agency actions that are undertaken, approved for, or funded in federal nonattainment or maintenance areas when the total net change in direct and indirect emissions of nonattainment pollutants (or their precursors) exceeds specified thresholds. Because the assessment area is not in a nonattainment area, the proposed action is exempt from the CAA general conformity rule.

As an attainment area, counties in the assessment area (Eureka, Esmeralda, Lander, and Nye) are classified as Class II under Prevention of Significant Deterioration (PSD) guidelines. Air quality control regions are classified either as Class I, II, or III to indicate the degree of air quality deterioration that the state or federal government will allow, while not exceeding NAAQS (though no Class III areas have been designated). In a Class II area, a moderate change in air quality due to industrial growth, while still maintaining air quality that meets the NAAQS, would be allowed. Class I areas are special areas of natural wonder and scenic beauty, such as national parks, national monuments, and wilderness areas, where air quality should be given special protection. Class I areas are subject to maximum limits on air quality degradation. There are no PSD Class I visibility protection areas in the Assessment area.

The CAA requires each state to identify areas that have ambient air quality in violation of federal standards. The status of areas with respect to federal ambient air quality standards is categorized as nonattainment, attainment (better than national standards), or unclassified (due to an absence of monitoring data). Areas that have been redesignated from nonattainment to attainment are considered maintenance areas. Unclassified areas are treated as attainment areas for most regulatory purposes. All of the assessment area is considered attainment or unclassified for all federal ambient air quality standards.

The Nevada Bureau of Air Quality Planning operates and maintains a network of ambient air quality monitors throughout rural Nevada. The only active monitors within the assessment area are within the Pahrump Valley at the southern tip of Nye County (also the southern tip of the Assessment area). These monitors measure PM_{10}. Excluding one exceptional event (e.g., high wind conditions), no exceedances of the PM_{10} NAAQS occurred from 2010 through 2012.

PM_{10} was monitored at two locations in Battle Mountain (at the northern tip of the assessment area) from 1992 to 1998 and from 1998 to 2002. These monitors were taken off-line because measurements were consistently well below the NAAQS for PM_{10} (NDEP, Bureau of Air Quality Planning 2011).

The nearest active monitoring stations outside the assessment area are located in Fallon and Fernley to the west and Elko to the east. The Fallon station monitors ozone, the Fernley station monitors ozone and $PM_{2.5}$, and the Elko station monitors PM_{10}. Excluding one exceptional event in Elko in 2010, no exceedances of the monitored NAAQS occurred from 2010 through 2012 at these stations.

Current Conditions

The BLM published the final Rapid Ecoregional Assessment (REA) for the Central Basin and Range in June 2013 (Comer et al. 2013). REAs examine climate change and other widespread environmental influences that are affecting western landscapes. REAs look across an ecoregion to more fully understand ecological conditions and trends; natural and human influences; and opportunities for resource conservation, restoration, and development. The REAs provide regional information that can inform local management efforts.

Over the past 100 years, the weather, vegetation cover, and wildfire regimes of the Central Basin and Range ecoregion have changed, suggesting a change in the ecoregion's climate regime. Changes in temperature and precipitation have resulted in changes to vegetation cover and wildfire regimes. Changes are expressed in species composition, changes in vegetation communities, and increasing quantities of invasive species. Many areas once dominated by sagebrush have piñon-juniper encroachment as well as downy brome (cheatgrass).

Greenhouse Gas Emissions

Greenhouse gases (GHGs) are those that allow short-wave solar radiation to enter the earth's atmosphere but absorb long-wave infrared radiation reemitted from the earth's surface. Greenhouse gases can affect climate patterns, which in turn can affect resource management.

Gases exhibiting greenhouse properties come from both natural and human sources. Water vapor, carbon dioxide, methane, and nitrous oxide are examples of greenhouse gases that have both natural and man-made sources, while other greenhouse gases, such as chlorofluorocarbons, are exclusively man-made.

Sources of greenhouse gas emissions within the Project Area are wildfires and prescribed burns, vehicles (including OHVs), construction and operation for mineral and energy development, and grazing livestock, wild horses, and burros. To the extent that these activities increase, greenhouse gas emissions are also likely to increase.

Climate Change

Climate represents the long-term statistical characterization of daily, seasonal, and annual weather conditions such as temperature, relative humidity, precipitation, cloud cover, solar radiation, and wind speed and direction. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. A region's climate is affected by latitude, terrain, and altitude, as well as nearby water bodies and their currents.

Warmer and more arid conditions, coupled with a shorter snow season, have led to limited water supplies and severe drought in parts of the state. By 2100, the average temperature in Nevada is predicted to increase by 3°F to 4°F in the spring and fall and by 5°F to 6°F in the summer and winter. El Niño events are predicted to increase in frequency and duration as a

result of global climate change. These temperature changes would affect evaporation and precipitation in the state, likely resulting in the decreased availability of water (National Conference of State Legislatures 2008).

In the Central Basin and Range ecoregion, climate models suggest there is no strong trend toward either wetter or drier conditions either in the near future (through the 2020s) or in the long term (through the 2050s; Comer et al. 2013). However, models show significant increases in maximum monthly temperatures by 2020, primarily in the summer months (July, August, and September). The highest maximum temperature increase projected is 6 °F. These increases are predicted to occur mostly in the southern and northeastern edges of the ecoregion. Forecasts for 2060 predict substantial increases in maximum temperature for all months. Similar to forecasts for 2020, the greatest increases are predicted during the summer months and along the southern and northeastern edges of the ecoregion (Comer et al. 2013). Model forecasts for minimum temperatures show a considerable change in both rate and magnitude over most of the study area. July through September showed the greatest degree of change over most of the region.

Data for precipitation suggest no strong trend toward either wetter or drier conditions in any month for the ecoregion. With the exception of a slight increase in summer monsoon rains toward the south and east, there were no significant forecasted trends in precipitation for any other months in either the near-term (2020s) or midcentury (2050s) projections (Comer et al. 2013).

Potential effects of these forecasts on the landscape could include increased fuel loads in higher elevations, increased frequency and duration of droughts, expansion of invasive species in higher elevations, increased wind erosion, and changes in wildfire regimes (Comer et al. 2013).

Environmental Consequences

While the act of leasing the parcels would produce no substantial air quality effects, potential future development of the lease could lead to increases in area and regional emissions. Since it is unknown if the parcels would be developed, or the extent of the development, it is not possible to reasonably quantify potential air quality effects through dispersion modeling or another applicable method at this time. Further, the timing, construction and production equipment specifications and configurations, and specific locations of activities are also unforeseeable at this time. Additional air effects will be addressed in a subsequent analysis when lessees file an APD. All proposed activities including, but not limited to, exploratory drilling activities would be subject to applicable local, State, and Federal air quality laws and regulations.The Bureau of Land Management National Operations Center (BLM NOC) retained the Kleinfelder Team (which consisted of staff from Kleinfelder, Inc. and ENVIRON International Corporation) to prepare an emissions inventory estimate of criteria pollutants, greenhouse gases (GHG), and key hazardous air pollutants (HAPs) for a representative oil and gas well in the western United States (US). The emissions inventory was designed to be used by BLM staff, such as NEPA planners, air resource specialists, and natural resource specialists, to evaluate emissions from small, which for purposes of this inventory is approximately five wells or less, oil and gas projects. The table, below, is taken from this March 2013 report:

Erbes, Air Emissions Inventory Estimates for a Representative Oil and Gas Well in the Western United States. The RFD developed for this lease sale EA is a maximum of 25 exploration wells drilled within the parcels in the Battle Mountain District and no production wells. As previously stated, even though no production wells or oil fields are anticipated under the RFD, the table is provided to reflect emissions that may be produced from these subsequent activities. The number of holes that could be drilled in any given area is unknown but potential emissions would be multiplied appropriately.

Well Type	**Gas**	**Gas**	**Gas**	**Oil**	**Oil**
Pollutant	Uinta/Piceance (tpy)	Upper Green River (tpy)	San Juan (tpy)	Williston (tpy)	Denver (tpy)
NOx	15.6	14.6	5.6	15.6	6.3
CO	3.8	3.9	3.1	8.0	3.4
VOC	3.4	5.2	5.3	17.6	6.7
SO_2	0.0004	0.0004	0.001	0.001	0.001
PM_{10}	6.9	6.7	6.8	6.9	6.6
$PM_{2.5}$	0.8	0.8	0.5	0.8	0.5
CO_2	2,552.1	2,552.1	651.0	3156.4	1,049
CH_4	12.2	14.1	6.1	16.6	1.8
N_2O	0.05	0.05	0.04	0.6	0.04
GWP	2,825	3,194	791	3,682	1,099
Benzene	1.4	1.5	1.4	1.5	1.4
Toluene	1.0	1.2	1.0	1.0	1.0
Ethybenzene	0.00003	0.01	0.0008	0.0008	0.0006
Xylene	0.6	0.7	0.6	0.6	0.6
n-Hexane	7.5	7.5	7.5	7.9	7.5
Total HAPs	10.4	10.9	10.5	11.0	10.5

Note: Sums may not precisely total due to round off differences. A value of 0.00 indicates that pollutant is not emitted or emitted in *de minimis* amounts. If there is a non-zero value, at least one significant figure is reported. Greenhouse gas emissions are in terms of short tons CO_2, CH_4, and N_2O. Global Warming Potential (GWP) is in terms of short tons of CO_2 equivalent (CO_2e), using a GWP of 1 for CO_2, 21 for CH_4, and 310 for N_2O.
(Erbes, 2013)

Any subsequent activity authorized after APD approval could include soil disturbances resulting from the construction of well pads, access roads, pipelines, power lines, and drilling. Any disturbance is expected to cause increases in fugitive dust and potentially inhalable particulate matter (specifically PM_{10} and $PM_{2.5}$) in the project area and immediate vicinity. Particulate matter, mainly dust, may become airborne when drill rigs and other vehicles travel on dirt roads to drilling locations. Air quality may also be affected by exhaust emissions from engines used for drilling, transportation, gas processing, compression for transport in pipelines, and other uses. These sources would contribute to potential short and long term increases in the following criteria pollutants: carbon monoxide, ozone (a secondary pollutant, formed photochemically by combining VOC and NOX emissions), nitrogen dioxide, and sulfur

dioxide. Non-criteria pollutants (for which no national standards have been set) such as carbon dioxide, methane, nitrous oxide, air toxics (e.g., benzene), and total suspended particulates (TSP) could also be emitted. Certain pollutants may be significant when evaluating AQRV for effects on visibility and atmospheric deposition. Significance would depend greatly on the proximity to sensitive receptors, area meteorology, and the background levels of AQRV at any sensitive receptor. Dust control measures, such as applying a layer of gravel over the travel surfaces, watering travel surfaces, and reducing speed along the roadways can be very effective in mitigating dust issues.

During exploration and development, 'natural gas' may at times be flared and/or vented from conventional, coal bed methane, and shale wells. The gas is likely to contain volatile organic compounds that could also be emitted from reserve pits, produced water disposal facilities, and/or tanks located at the site. The development stage may likely include the installation of pipelines for transportation of raw product. New centralized collection, distribution and/or gas processing facilities may also be necessary. The decision to offer the identified parcels for lease would not result in any direct emissions of air pollutants. However, any future exploration or development of these leases will result in emissions of criteria, HAP and GHG pollutants. The additional emissions could result in an incremental increase in overall emissions of pollutants, in the region depending on any contemporaneous activities occurring at the same time when potential exploration and development occurring on the lease would happen.

Climate Change Impacts
Secretarial Order 3289 was issued in 2009 which directs each Bureau to: "consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, and/or when making major decisions affecting DOI resources."

The primary sources of greenhouse gases associated with oil and gas exploration and production are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). In addition, nitrous oxide and VOCs are indirect air pollutants that contribute to ozone production and aid in prolonging the life of methane in the atmosphere. With respect to climate change, climate plays a significant role in the production of ozone. Sunlight and high temperatures are a major catalyst in reactions
between VOCs and NOx in the production of ozone. With an increase in overall temperature, we can expect to have more hot days and less precipitation that will lead to a higher production of ozone.

GHGs are produced and emitted by various sources during phases of oil and gas exploration, well development, production, and site abandonment. The American Petroleum Institute (API) categorizes sources of emissions from all oil and gas operations into the following classifications:

Direct Emissions

- Combustion Sources – includes stationary devices (boilers, heaters, internal combustion engines, flares, burners) and mobile devices (barges, railcars, and trucks

for material transport; vehicles for personnel transport; forklifts, construction equipment, etc.).

- Process Emissions and Vented Sources - includes process emissions from glycol dehydrators, stacks, vents, ducts; maintenance/turnaround; and non-routine activities such as pressure relief valves, emergency shut-down devices, etc.
- Fugitive Sources- includes fugitive emissions from valves, flanges, pumps, connectors, etc.; and other non-point sources from wastewater treatment.

Indirect Emissions
Emissions associated with company operations, such as off-site generation of electricity, hot water or steam, and compression for on-site power, heat and cooling. Direct and indirect GHG emissions may occur from various sources during each phase of exploration and development. During exploration and development, emissions are generated from well pad and access road construction, rigging up/down, drilling, well completion, and testing phases. GHG emissions for these phases are mainly CO_2 emissions from fuel in internal combustion engines of diesel trucks, equipment, and rigs.

There are currently no established thresholds of significance for GHG, but the EPA has used a reporting threshold of direct GHG emissions of 25,000 tons per year of carbon dioxide equivalent (74 FR 56260, October 30, 2009).

For this analysis, the RFD predicts that up to 25 wells may be drilled as a result of the proposed action, however, the offered parcels are scattered across the district and predictions of how many holes would actually be drilled in any location cannot be determined. More accurate analysis would be completed at the exploration and development phase, after leasing is complete.

In addition to the mandatory GHG reporting requirement and regulatory requirements to reduce GHGs, the BLM encourages federal oil and gas lessees and/or operators to implement "Best Management Practices (BMPs)" that reduce GHG emissions. As identified in the EPA Inventory of US Greenhouse Gas Emissions and Sinks, the BLM holds regulatory jurisdiction over portions of natural gas and petroleum systems. Exercise of this regulatory jurisdiction has led to development of BMPs designed to reduce emissions from field production and operations. Analysis and approval of future development would include applicable BMPs as Conditions of Approval (COAs) in order to reduce or mitigate GHG emissions. Additional measures developed at the project development stage would be incorporated as COAs in the approved APD, which is binding on the operator.

Since oil and gas exploration activity is expected to be minimal (see Section 3.4) impacts to air quality are not expected to be significant. The Proposed Action would not result in an exceedance of the National Ambient Air Quality Standards (NAAQS) standards.

3.4.2 Cultural and Paleontological Resources

Cultural Resources Affected Environment
Cultural resources include prehistoric and historic-period resources such as buildings, sites, structures, objects, and districts. Prehistoric cultural resources are associated with the human

occupation and use of Nevada before long-term European occupation and include traces of Native American life such as camp sites, rock art, and trails, some dating to over 12,000 years. Historic-period cultural resources represent both the archaeological and built-environment, including structures, historic districts, and the foundations of industrialization.

Parcels proposed for the 2015 lease sale are located in nine areas: in Smith Creek Valley, with two parcels along the eastern flank of the Desatoya Mountains; along the peaks and western slopes of the Fish Creek Range southeast of Spring Valley; along the western boundaries of Ione Valley where it meets the northeastern boundary of the Paradise Range; two parcels in Big Smoky Valley north and northwest of Round Mountain; in the Pactolus Hills from the Nye and Mineral County line to the western bajadas of Ione Valley; between the Royston Hills and Big Smoky Valley to north of Lime Mountain; southwestern Monitor Valley west of the McKinney Mountains; Lone Mountain and General Thomas Hills to the Ralston Valley south and west of Tonopah; and parcels between the Monitor Hills, Stone Cabin Valley, and Fourmile Basin east of Tonopah.

Environmental Consequences

Although limited cultural resource surveys have been completed within the proposed parcels, (about 5% of the total parcel acreage has been surveyed at the Class III level), all are likely to contain areas of high sensitivity for these resources. Within these areas, Smith Creek Valley, Big Smoky Valley, and Monitor Valley have perhaps the greatest potential for significant cultural resources. The act of selling oil and gas leases, although not authorizing exploration, development or production prior to site specific NEPA analysis, has the potential to impact cultural resources because it gives the lessee certain irrevocable rights and can foreclose the authorized officer's use of some mitigation measures. Once issued, a lease bestows upon its owner the "right to use so much of the lease lands as is necessary to explore for, drill for, mine, extract, remove and dispose of the leased resource in the leasehold" (43 CFR§ 3101.1-2) subject to specific nondiscretionary statues and lease stipulations.

Cultural resources located within the proposed parcels may be subject to direct and indirect effects from potential oil and gas exploration and development activities (e.g. ground disturbance and facilities construction); therefore, identification and evaluation of these resources on a case-by-case basis for compliance with Section 106 of the National Historic Preservation Act (NHPA) would be required prior to project implementation or ground disturbing activities. Section 106 compliance activities would include the identification of cultural resources within parcels, evaluation of cultural resources for their eligibility for listing in the National Register of Historic Places (NRHP), and resolution of any adverse effects to historic properties (i.e., resources eligible for or listed in the NRHP). Resolution of adverse effects to historic properties, including mitigation, would be conducted in accordance with all applicable authorizes, including the Nevada State Protocol Agreement (January 2014). The Nevada State Protocol Agreement also includes actions exempt from inventory, such as conducting minerals exploration that conforms to casual use in accordance with 43 CFR § 3802.1-2 and 43 CFR §3809.5(1).

Affected Environment Paleontological Resources

Paleontological resources are defined in the federal Paleontological Resources Preservation

Act (PRPA [also commonly known as the Omnibus Act]) as the "fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth" (16 United States Code [U.S.C.] 470aaa[1][c]).

Parcels proposed for the 2015 lease sale are located in nine areas: in Smith Creek Valley, with two parcels along the eastern flank of the Desatoya Mountains; along the peaks and western slopes of the Fish Creek Range southeast of Spring Valley; along the western boundaries of Ione Valley where it meets the northeastern boundary of the Paradise Range; two parcels in Big Smoky Valley north and northwest of Round Mountain; in the Pactolus Hills from the Nye and Mineral County line to the western bajadas of Ione Valley; between the Royston Hills and Big Smoky Valley to north of Lime Mountain; southwestern Monitor Valley west of the McKinney Mountains; Lone Mountain and General Thomas Hills to the Ralston Valley south and west of Tonopah; and parcels between the Monitor Hills, Stone Cabin Valley, and Fourmile Basin east of Tonopah.

Environmental Consequences

Formations or rock units which are known to yield vertebrate or significant invertebrate, plant, or trace fossils, have a high potential for containing additional significant paleontological resources. All nine areas have the potential to contain rock units with vertebrate or other significant fossils. Paleontological resources may be subject to direct and indirect impacts from potential oil and gas exploration and production activities; therefore, identification and evaluation of these resources would be required on a case-by-case basis prior to project implementation or ground disturbing activities. BLM Instruction Memorandum (IM) No. 2009-011 provides guidelines for assessing potential impacts to paleontological resources in order to determine mitigation steps for federal actions on public lands under the Federal Lands Policy and Management Act (FLPMA) of 1976 (Public Law [PL] 94–579, codified at 43 U.S.C. 1701–1782 and 18 U.S.C. 641) and NEPA. Additionally, this IM provides procedures for field survey and monitoring to avoid adversely affecting significant paleontological resources.

3.4.3 Native American Cultural Concerns

Affected Environment

The area described in the Proposed Action lies within the traditional territory of the Western Shoshone and possibly the Paiute Tribes. Sites and resources considered sacred or necessary to the continuation of tribal traditions include, but are not limited to: prehistoric and historic village sites, pine nut gathering locations, sites of ceremony and prayer, archaeological sites, burial locations, "rock art" sites, medicinal/edible plant gathering locations, areas associated with creation stories, or any other tribally designated Traditional Cultural Property. Specific locations in the area were not identified or shared. Future Native American Consultations in the area may reveal such sites, activities, or resources.

Tribal Consultation/Information Sharing: The BLM, Battle Mountain District, Mount Lewis and Tonopah Field Offices have ongoing invitation for consultation and information sharing with the tribes. Consultation and communication with these tribal/band governments have included letters, phone calls, e-mails, and visits with individual Tribal/Band Environmental

Coordinators. Consultation/Information Sharing will continue throughout the life of the project.

Tribal ethnographic resources are associated with the cultural practices, beliefs, and traditional history of a community. In general, ethnographic resources include places in oral histories or traditional places, such as particular rock formations, the geothermal water sources, or a rock cairn; large areas, such as landscapes and viewscapes; sacred sites and places used for religious practices; social or traditional gathering areas, such as racing grounds; natural resources, such as plant materials or clay deposits used for arts, crafts, or ceremonies; and places and natural resources traditionally used for non-ceremonial uses, such as trails or camping locations.

The NEPA process does not require a separate analysis of impacts to religion, spirituality, or sacredness. As a result, references to such beliefs or practices convey only the terminology used by participants involved in the ethnographic studies and tribal consultation. This terminology does not reflect any BLM evaluation, conclusion, or determination that something is or is not religious, sacred, or spiritual in nature, but conveys only the information that has been gathered through tribal consultation and coordination and current and historic ethnographic study.

The majority of lands within the proposed action area have not been analyzed for cultural resources or Native American Cultural Concerns. Therefore, the BLM contacted the South Fork Band of the Western Shoshone, Duckwater Shoshone Tribe, Yomba Shoshone Tribe, Timbisha Shoshone Tribe, Fallon Paiute-Shoshone Tribe, and Walker River Paiute Tribe Battle Mountain to identify areas of concern, mitigation measures, operating procedures or alternatives that may eliminate or reduce impacts to any existing tribal resources.

Environmental Consequences

Although the act of selling oil and gas leases does not directly authorize exploration, development, or production, or any other related ground disturbing activities, the potential exists to impact Native American sites of a spiritual, cultural, or traditional nature. The types of resource uses by traditional activities and current religious practices often cannot be easily or effectively mitigated for, however, impacts can be minimized and/or mitigated when affected Tribes provide input and actively and fully participate in the decision making process.

If parcels were developed in the future, the BLM would consult with the tribes and site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

3.4.4 Wildlife Resources

Regulatory Framework

BLM Special Status Species

The lease area may contain BLM BMDO special status species (SSS) plants, animals or their habitat (see Appendix D for the BMDO SSS list). BLM SSS are defined as those plant and animal species for which population viability is a concern, as evidenced by: 1) significant current or predicted downward trend in population numbers or density, or 2) a significant current or predicted downward trend in habitat capability that would reduce the species' existing

distribution. SSS also include federally listed species under the Endangered Species Act (ESA; i.e., threatened, endangered or candidate; see section below). These SSS animals are protected under provisions of the ESA or under BLM Manual 6840, *Special Status Species Management*. BLM has species-specific recommendations to avoid or modify activities that are likely to disturb SSS or severely degrade critical habitat. In many cases, the BLM requires that surveys are conducted for SSS species. BLM would not approve any ground-disturbing activity that may negatively affect federally listed species or critical habitat, until it completes its obligations under applicable requirements of the ESA as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.

Endangered Species Act (ESA)

In accordance with Section 7 of the ESA, federal agencies must "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species." The purpose of the ESA is to provide a means for conserving the ecosystems upon which threatened and endangered species depend and to provide a program for protecting these species. The ESA defines an endangered species as a species that is in danger of extinction throughout all or a major portion of its range. A threatened species is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a major portion of its range. This Act also address species that have been proposed for listing as either threatened or endangered, but for which a final determination has not been made. These so-called "candidate" species are those for which the US Fish and Wildlife Service (USFWS) has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other, higher priority listing activities. Critical habitat is a specific area or type of area that is considered to be essential for the survival of a species, as designated by the USFWS under the ESA.

Within the BMD, there are eight listed as threatened, endangered, proposed, or candidate species by the USFWS (see Appendix D)**.** Of these, Greater sage-grouse (candidate species) are the only species likely to occur in the proposed lease sale parcels. However, parcel sales would not occur in Preliminary Priority Habitat (PPH), Preliminary General Habitat (PGH), and/or within four (4) miles of leks.

BLM and Nevada Department of Wildlife Memorandum of Understanding

Wildlife and fish resources and their habitat on public lands are managed cooperatively by the BLM and NDOW under a MOU as established in 1971. The MOU describes the BLM's commitment to manage wildlife and fisheries resource habitat and the NDOW's role in managing populations. The BLM meets its obligations by managing public lands to protect and enhance food, shelter and breeding areas for wild animals. The NDOW assures healthy wildlife numbers through a variety of management tools including wildlife and fisheries stocking programs, hunting and fishing regulations, land purchases for wildlife management, cooperative enhancement projects and other activities.

Nevada Department of Wildlife Programs

The NDOW is the state agency responsible for the restoration and management of fish and wildlife resources within the state. The NDOW administers state wildlife management and

protection programs as set forth in NRS Chapter 501, Wildlife Administration and Enforcement and NAC Chapter 503, Hunting, Fishing and Trapping; Miscellaneous Protective Measures. NRS 501.110 defines the various categories of wildlife in Nevada, including protected categories. NAC 503.010-503.080, 503.110 and 503.140 lists the wildlife species currently placed in the state's various legal categories, including protected species, game species and pest species.

Migratory Bird Treaty Act and Migratory Bird Conservation Act

Migratory birds, with the exception of native resident game birds, are protected under the provisions of the Migratory Bird Treaty Act (MBTA) of 1918. Under this act, nests with eggs or the young of migratory birds may not be harmed, nor may any migratory birds be killed. Measures to prevent bird mortality must be incorporated into the design of a given project. To comply with the MBTA, it is recommended that any land clearing or other surface disturbance associated with proposed actions within the project area be timed to avoid potential disturbance of breeding birds or their nests and young. Disturbance of breeding birds or destruction of nests with eggs or young is a violation of the MBTA. The BLM recommends that land clearing be conducted outside the avian breeding season. For most birds, the breeding season is considered to be from March 1 – July 31 (but see guidelines for Raptors and Eagles below). If land clearing is not feasible outside of the breeding season, the BLM recommends that a qualified biologist survey the area prior to land clearing. These surveys are only good for 14 days. If activity is not completed before that window is finished then another survey may be needed. If nests are located, or if other evidence of nesting (*i.e.*, mated pairs, territorial defense, carrying nesting material, transporting of food) is observed, a protective buffer (the size depending on the habitat requirements of the species) should be delineated and the entire area avoided until young fledge or the nest is no longer occupied.

Guidance for raptors differs from migratory songbirds in that 1) the nesting season is extended (March 1- July 31) and 2) the survey area is larger (surveys will be conducted in the project area in addition to a 1 mile buffer surrounding the proposed surface disturbance). This survey buffer may be reduced or altered based on topography and the presence of other physical barriers.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668) applies primarily to taking, hunting and trading activities that involve any bald or golden eagle. The act prohibits the direct or indirect take of an eagle, eagle part or product, nest, or egg. The term “take” includes “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.” Golden eagles are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, both of which prohibit take.

The USFWS has guidance for proposed projects that have the potential to impact eagles or their habitat. Generally, the steps in these guidelines include 1) surveying for nests within an appropriate radius of the project, 2) developing an eagle conservation plan (ECP) in cases where eagles and/or their nests are likely to be impacted, 3) determining if the project has the potential to disturb breeding behavior and 4) determining if the proponents need to apply for a permit to authorize unintentional take.

Surveys for golden eagle nests would be designed in coordination with BMD biologists to target the most probable locations near the parcels.

Other Regulations

The Sikes Act is federal legislation that authorizes the USDI to plan, develop, maintain and coordinate programs with state agencies for the conservation and rehabilitation of wildlife, fish and game on public lands. The Fish and Wildlife Conservation Act of 1980 encourages federal agencies to conserve and promote the conservation of non-game fish and wildlife species and their habitats.

Affected Environment

The BMD provides habitat for approximately 73 mammals, 231 birds, 24 reptiles, 7 amphibians, 19 fish species and numerous invertebrate species (many of which have yet to be inventoried or identified to species). Several of these wildlife species are likely to occupy the oil and gas proposed lease sale parcels, including migratory birds, golden eagles and other raptors, Greater sage-grouse, bats, pronghorn antelope and mule deer. In particular, parcels that contain or are adjacent to riparian areas (e.g., streams, springs, seeps and wet meadows) are likely to support a high density of wildlife species. Other important wildlife habitat types within the sale parcels include big sagebrush (mountain and Wyoming big sagebrush), low sagebrush, pinyon-juniper woodlands, aspen woodlands and salt desert scrub vegetation.

The following sections briefly discuss a few select wildlife species that are likely to occur on the oil and gas lease sale parcels and for which federal law or BLM policy and guidance directs management actions.

Migratory Birds

A wide variety of bird species protected by the MBTA are found throughout all habitat types within the proposed lease parcels. These include raptors (i.e., hawks, eagles and owls) and many songbirds. Major avian communities within the BMD occur in sagebrush, salt shrub, pinyon-juniper, montane, riparian and aspen habitats. Species commonly occurring in pinyon-juniper habitats and that are known to occur or have the potential to occur include the pinyon jay, western bluebird, Virginia's warbler, black-throated gray warbler and Scott's oriole. Sage thrasher, Brewer's sparrow and sage sparrow use sagebrush habitats, while loggerhead shrike and green-tailed towhee also have potential to occur in the sagebrush habitats. Many songbird species are heavily dependent on healthy riparian systems. Seventy-seven bird species have been identified as either riparian obligate or riparian dependent in the western United States (Rich 2002) and these communities are requisite for a diverse migratory bird community.

Eagles

Golden eagles are widespread year-round residents across the BMD. Golden eagles typically nest on large cliffs and they forage on small mammals such as jackrabbits, cottontails and ground squirrels in open shrub, grassland and forested habitats. Alternatively, bald eagles do not nest in the BMD, but they do occur during the winter near relatively large open bodies of water.

Greater sage-grouse

Greater sage-grouse occur within sagebrush habitat in Eureka, Lander and northern portions of Nye County on the BMD. Sage-grouse are largely dependent on sagebrush for nesting, brood

rearing and foraging. Greater sage-grouse are known to occur in foothills, plains and mountain slopes where sagebrush meadows and aspen are in close proximity. Currently, sage-grouse are a candidate species for listing under the ESA.

Mule deer

Mule deer use a variety of vegetation types and habitats seasonally within the project area in their pursuit of forage, thermal cover and escape cover for seasonal needs. Vegetation important for mule deer includes serviceberry, snowberry, mountain mahogany, sagebrush, aspen, cottonwood, willows, chokecherry, wild roses, Pinyon pine, juniper, eriogonum, arrowleaf balsamroot, penstemon, phlox sp., sorrel, hawksbeard, lupine and numerous forbs. Riparian vegetation along streams, meadow areas and aspen stands are important fawn-rearing areas.

Pygmy rabbits

Pygmy rabbits are North America's smallest rabbits and the only ones that construct their own burrows. These burrows usually occur in stands of tall, dense sagebrush in areas with deep, loose soils. Big sagebrush is the primary food and may comprise up to 99 percent of food taken in winter and 51 percent in the summer. Wheatgrass and bluegrass were highly preferred foods in the summer. Cheatgrass invasion is detrimental to pygmy rabbits. Shrub cover is necessary for protection during dispersal and cheatgrass monocultures may provide a barrier to dispersal.

Bats

Bats inhabit or utilize many niches across the Nevada and the BMD. These include caves, abandoned mines, cliffs, springs, riparian, aspen, pinyon-juniper, subalpine coniferous forest and desert shrub habitats. Bats frequently forage in riparian areas and some of the most important bat habitat exists along perennial stream corridors.

Environmental Consequences

As previously stated, the sale of parcels and issuance of oil and gas leases is strictly an administrative action. The act of offering, selling, and issuing federal oil and gas leases does not produce impacts to wildlife resources Direct and indirect effects on specific wildlife species cannot be determined until site specific project proposals are analyzed at the APD stage of development. In general, mammals such as pronghorn antelope would avoid and move away from oil drilling activities. Based on the Reasonable Future Development scenario, oil and gas exploration and production activities are expected to disturb a total of 100 acres over the course of a ten year period. These activities are temporary in nature and wildlife would move back into the area after successful reclamation.

If parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis. In addition, to reduce potential impacts to wildlife several parcels known to contain habitat for SSS of fish and wildlife have been proposed for deferral (see Appendix C). These include all parcels that may contain 1) SSS fish, 2) Greater sage-grouse PPH, PGH and within 4 miles of leks, 3) and occupied bighorn sheep habitat (including lambing areas). Several parcels were also deferred because they contain (or were adjacent to) perennial streams, a high-density of riparian habitat, or uplands important to mule deer and other wildlife. Additionally, some parcels were not initially identified as sage grouse habitat, but bordered

identified PPH and/or PGH. During a site visit conducted by two BLM wildlife biologists, these parcels were found to have habitat qualities consistent with PGH/PPH and have also been proposed for deferral (see Appendix C).

3.4.5 Water Quality (Surface and Ground) and Quantity

Affected Environment

Water in the lease area is owned by the public of Nevada; however, the right to use surface and groundwater and management of water appropriations are administered by the Nevada Division of Water Resources (NDWR). The water quality standards of Nevada support other Federal laws such as the Clean Water Act of 1977, the Water Resources Planning Act of 1962, the Pollution Prevention Act of 1990 and the Safe Drinking Water Act of 1977 and are administered by the Nevada Division of Water Quality (NDWQ). The lease area is part of the Basin and Range Physiographic Province, a semiarid and arid desert environment with most precipitation originating as snow. Annual precipitation is highly variable. The average annual precipitation in Tonopah is 5.03 inches and March and April are the wettest months (WRCC 2013a). The average annual precipitation in Battle Mountain is 8.2 inches and April and May are the wettest months (WRCC 2013b).

Hydrographic Basins

The hydrographic basin is the basic management unit used by the NDWR. Table 3 identifies the hydrographic basin numbers, basin names, regions in which the proposed parcels are located and number of parcels in that basin. The proposed lease parcels are located in hydrographic region 10, Central Region. The majority of leases are within hydrographic basin 137, Big Smoky Basin. There are basins in the lease area that are designated by the State of Nevada.

Basin #	Basin Name	Region	Designated (Yes/No)	Perennial Yield (Acre Feet/Year)	Appropriation (Acre Feet/Year)	# of Parcels
137A	Big Smoky Valley – Tonopah	Central Region	Yes	6,000	24,011	60
122	Gabbs valley	Central Region	Yes	5,000	18,715	16
149	Stone Cabin Valley	Central Region	Yes	2,000	11,826	21
141	Ralston Valley	Central Region	Yes	6,000	4,307	20
151	Antelope Valley	Central Region	No	4,000	3,063	4
134	Smith Creek	Central Region	No	10,000	1,915	1
135	Ione Valley	Central Region	No	2,500	191	19
155A	Little Smoky Valley - Northern	Central Region	No	5,000	5055	3

Table 3. Hydrographic Basin Summary

Surface Water

Stream flows in the project area primarily occur as intermittent flows from isolated springs, as short-term seasonal runoff from snowmelt or winter storms, or as ephemeral flow from intense but infrequent thunderstorms. Numerous drainages leave the mountain fronts and cross over alluvial fans, where flows typically dissipate. When water does reach the valley floor during larger runoff events, the water is soon taken up by evapotranspiration and seepage into valley-floor sediments. In general, perennial surface water bodies within the vicinity of the proposed lease parcels are expressions of where the water table intersects the land surface and fluctuate with groundwater levels.

Most of the lease area consists of closed drainage basins, with a few watersheds to the north flowing toward the Humboldt River. According to the National Hydrography Dataset and National Wetlands Inventory, the offered lease area contains 5 springs, 1,644 km of ephemeral and intermittent streams, 15.5 acres of lakes and ponds, 169 acres of wetlands, and1.65 acres of playa. Unsurveyed features may exist.

The magnitude of surface water discharge varies in space and time. With the exception of moist winters in 2006 and 2010-2011, the Great Basin has been abnormally dry or within drought conditions since 2000. Since early 2012, the BMD and much of the Central Great Basin have consistently been in states of moderate to exceptional drought. The magnitude of the impacts to surface water resources from future development activities depends on the proximity of disturbances to drainage channels, slope aspect and gradient, degree and area of soil disturbance, soil character, duration of construction activities, and the timely implementation and success/failure of mitigation measures. Natural factors which attenuate the transport of sediment and salts into susceptible water bodies include water available for overland flow; the texture of the eroded material; the amount and kind of ground cover; the slope shape, gradient, and length; and surface roughness. Impacts would likely be greatest shortly after the start of construction activities and would likely decrease in time due to stabilization, reclamation, and revegetation efforts.

The Nevada Administrative Code Chapter 445A identifies class waters, which generally include smaller perennial streams that are tributaries to the large rivers in the state. The classification process is ongoing and not all water bodies have been classified. Water bodies are classified according to their quality and potential beneficial uses. The water quality standards correspond to these classes.

Groundwater

Runoff from upland areas of the lease area often infiltrates into the groundwater as it flows across the broad alluvial fans that transition into wide basins. Groundwater is either directed toward the playa and is lost to the atmosphere as evapotranspiration or seeps into deeper aquifers that compose larger regional flow systems. Two regional flow systems have been extensively studied by the USGS, the Death Valley Regional Flow System (Belcher 2004) and the Basin and Range Carbonate Aquifer System (Welch et al. 2007). However, a large proportion in the

middle of the Assessment area has not been studied. Perennial base flow from springs is largely driven by snowmelt runoff recharge. Depth to groundwater is highly variable throughout the offered Lease Area ranging from a few feet to hundreds of feet.

Nevada's groundwater quality standards are based on the assumption that groundwater should be maintained suitable for use as a drinking water source, unless the natural water quality prevents this. The State adopts the Federal primary and secondary drinking water standards (maximum contaminant limits) for groundwater resources. The chemical character and quality of groundwater varies in the Lease Area and depends largely on the mineral content of the rock, residence time, evapotranspiration and temperature.

The perennial yield is defined as the maximum amount of groundwater that can be harvested each year over the long term without depleting the groundwater reservoir or it being in disequilibrium. Perennial yields were quantified by USGS reconnaissance reports from the late 1940s to the 1970s. A hydrographic basin that has more appropriations than perennial yield is identified as a designated basin; the BMD has 29 basins that are fully or partially designated.

Riparian/Wetland Zones

Water quality and supply is intimately related to the health of riparian and wetland ecosystems. Riparian and wetland areas are the most productive and important ecosystems on the BMD. They represent less than one percent of the area, but contain the majority of biodiversity and are vital ecologic functions. Research has shown that riparian and wetland habitat characteristically has a Greater diversity of plant and animal species than adjoining areas. Approximately 5 springs, 1,644 km of ephemeral and intermittent streams, 15.5 acres of lakes and ponds, 169 acres of wetlands, and 1.65 acres of playa are within the proposed parcels. These streams may have associated riparian/wetland habitat. These streams may have associated riparian habitat.

Floodplains

Federal Emergency Management Agency (FEMA)-designated Zone A flood hazard areas, which would be flooded during a 100-year, 24-hour runoff event, have been delineated in some low-lying areas in the offered leasing area. There are a total of 11,205 acres of the offered lease parcels identified within Zone A flood hazard areas that would be subject to Federal Regulation and mitigation, however FEMA flood mapping data are not yet available in Esmeralda County, NV. Site specific analysis, to identify potential flood plain complications, would be required prior to drilling in parcels that meet this designation.

Municipal Watersheds

Areas within the lease area have been identified as having Municipal Water Supplies within the HUC-12 boundaries. Site-specific analysis, to identify potential impacts, would be required prior to drilling in parcels that meet this designation.

Environmental Consequences

The sale of parcels and issuance of oil and gas leases is strictly an administrative action. The act of offering, selling, and issuing federal oil and gas leases does not produce impacts to water quality and surface water. On-the-ground impacts would not occur until a lessee applies for and receives approval to drill on the lease. The BLM cannot determine at the leasing stage whether

or not a proposed parcel will actually be sold, or if it is sold and issued, whether or not the lease would be explored or developed. Consequently, the BLM cannot determine exactly where a well or wells may be drilled or what technology may be used to drill and produce wells, so the impacts listed below are generic, rather than site-specific. Subsequent development of a lease may result in long-and short term alterations to the hydrologic regime depending upon the location and intensity of development. Clearing, grading, and soil stockpiling activities associated with exploration and development actions could alter short term overland flow and natural groundwater recharge patterns.

Groundwater

There would be no direct impacts to groundwater due to oil and gas leasing because no authorization for surface disturbance would be granted. Impacts from development activities would be analyzed under a separate site-specific environmental analysis. All activities would be subject to BMPs, State and Federal Regulations and COAs. Potential impacts to groundwater by the development of a lease may include degradation of water quality and drawdown of existing water levels. Water quality issues may arise from either underground or surface contamination. The primary cause of underground degradation would be from improperly functioning well casings. Surface activities can degrade groundwater by infiltration of contaminants, particularly from sumps and spills. Areas with shallow groundwater levels would be at greater risk and may be subject to additional constraints. All required state and federal regulations would apply and site-specific stipulations and mitigation may be applied on the APD.

Hydraulic Fracturing (HF) is one method of well stimulation used in oil and Gas production. HF is designed to change the producing formations' physical properties by increasing the flow of water, gas, and/or oil around the well bore. This change in physical properties may open up new fractures or enhance existing fractures that could result in freshwater aquifers being contaminated with natural gas, condensate and/or chemicals used in drilling, completion and hydraulic fracturing. Impacts to groundwater resources could occur due to failure of well integrity, failed cement, surface spills, and/or the loss of drilling, completion and hydraulic fracturing fluids into groundwater. Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. The potential for negative impacts to groundwater caused from HF, are currently being investigated by the Environmental Protection Agency. All HF operations would be subject to the standards of the State of Nevada, Third Revised Proposed Regulation R011-14 when approved. Nationally, the BLM is also working on rules to require companies to publicly disclose the chemicals used in hydraulic fracturing operations on public and Indian land. The final release of those rules is still pending. For additional information on risks to groundwater from HF, refer to Appendix E.

Surface Waters

There would be no impacts to Surface Waters due to oil and gas leasing because no direct authorization of surface disturbance is expected. Impacts from development activities would be analyzed under a separate site-specific environmental analysis. Runoff associated with storm events could increase sediment/salt loads in surface waters down gradient of the disturbed areas. Sediment may be deposited and stored in minor drainages where it could be readily moved

downstream (within closed basins) during heavy storms. Sediment from future development activity may be carried into contained basins and sloughs. All activities would be subject to BMPs, State and Federal Regulations and COAs. Potential impacts of lease development on surface waters may include changes to water quantity and quality. If future surface disturbing activities are proposed near surface waters or wetlands/riparian zones, the environmental analysis and decision record/record of decision would require additional mitigation. All operations would be required to comply with all state and federal regulations.

Riparian Areas and Wetlands

There would be no impacts to Riparian and Wetlands due to oil and gas leasing because no direct authorization of surface disturbance is expected. Impacts from development activities would be analyzed under a separate site-specific environmental analysis. All activities would be subject to BMPs, State and Federal Regulations and COAs. Surface disturbance adjacent to wetlands/riparian zones and adjacent flood plains has the potential to adversely affect the functioning condition of a riparian area's soil and watershed attributes, as well as, disturb or displace wildlife. In addition 22 parcels with important riparian and wetland resources have been recommended for deferral (See Appendix C).

When considering the RFD, environmental impacts cannot be determined for individual leases or for exploration and development of production activities. Existing data describing existing water systems, ground water reservoirs, oil and gas reservoirs, the interrelationships of these systems, or specific exploration, development and production activities are inadequate to determine specific effects of these activities within the offered parcels. Potential impacts from these exploration and production activities would be minimized through updated site-specific mitigation measures, COAs, and BMPs, which may help ensure of the long-term health of the assessment areas hydrologic system and water quality.

3.4.6 Waste, Hazardous and Solid

Affected Environment

Oil and gas development, which can include exploration drilling, extraction, production facilities, pipeline transport, tanker loading and unloading, affect the environment through production of waste fluids, emissions and site impacts resulting from field development and related infrastructure. Hazards that may be encountered include the following: oil spills, produced waters, drill cuttings and fluids and hazardous materials.

Environmental Consequences

Examples of environmental impacts from hazardous materials, hazardous waste, and solid waste which might be encountered in the RFD are provided below.

Exploration

Impacts could include drilling fluid or hydrocarbon spills, leakage from improperly constructed sump ponds or waste water collection systems, improperly handled brine water from drilling, and accumulations of solid waste, which could impact water quality or contaminate soils.
4-9 Hydrocarbon spills could consist of hydraulic fluid, gasoline, oil, or grease from vehicles, generators and exploration drill rigs. Brine water from exploration drilling, if improperly disposed of, could raise the pH of existing surface waters to unacceptable levels. Accumulations

of nonhazardous solid waste could include trash, drill cuttings, wastewater, bentonite and cement generated during drilling operations.

Production / Development
Impacts could be the same as in the exploration phase; however, the quantities of hazardous materials, hazardous waste, or solid waste used and generated could be Greater. Additionally stormwater runoff could contain elevated quantities of heavy metals and volatile organic compounds. Nonhazardous solid waste could be generated at this stage, which would increase the potential for contamination of water and soil, as well as toxic impacts to wildlife.

Production
Impacts of the long-term production phase could include spills and leaks from routine plant operations. Examples of these substances could be hydraulic fluid, gasoline, oil, paint, antifreeze, cleaning solvents, transformer insulating fluid, and grease. These discharges could result in adverse impacts to water, soil, air, and wildlife. Accidental releases from sumps or waste water collection systems could include hazardous water treatment chemicals such as chlorine. Stormwater runoff containing heavy metals and volatile organic compounds could be problematic. Nonhazardous solid waste would also be generated (i.e., drilling muds).

Final Abandonment
The operator would identify, remove, and properly dispose all hazardous materials, hazardous waste, and solid waste. Spills could occur during the removal operations. Based on meeting regulatory requirements and implementing leasing stipulations, adverse impacts from hazardous materials would be minor.

When the RFD for the BMD is considered, impacts to natural resources would be negligible because the substances used for these operations (as described in the affected environment) would be properly handled, stored, and disposed of. Proper management of these substances as defined by federal and state regulations would ensure that no soil, ground water, or surface water contamination would occur with any adverse effect on wildlife, worker health and safety, or surrounding communities. The Proposed Action would allow inclusion of updated mitigation measures, BMPs, and COAs. Performance standards would be defined during site-specific analysis for exploration, production, and development. For additional information on hazardous waste risks from HF, refer to Appendix E.

3.4.7 Noxious Weeds and Invasive, Non-native Species

Affected Environment

Noxious weeds, invasive and non-native plant species are highly competitive, highly aggressive, and spread easily. A noxious weed is a plant species that has been defined as a pest by law or regulation. The BLM defines a noxious weed as “a plant that interferes with management objectives for a given area of land at a given point of time.” The list of the species that are designated as noxious weeds within Nevada is found in the Nevada Administrative Code (NAC), Chapter 555, Section 010 (NAC 555.010). Currently the list contains 47 noxious weed species. When considering whether to add a species to the list, the Nevada Department of Agriculture (NDOA) makes a recommendation after consulting with outside experts and a panel comprising Nevada Weed Action Committee members. Per NAC 555.005, if a species is found probable to

be "detrimental or destructive and difficult to control or eradicate", the NDOA, with approval of the Board of Agriculture, designates the species as a noxious weed. The species is then added to the noxious weed list in NAC 555.010. Upon listing, the NDOA will also assign a rating of "A", "B", or "C" to the species. The rating reflects the NDOA's view of the statewide importance of the noxious weed, the likelihood that eradication or control efforts would be successful and the present distribution of noxious weeds within the state.

An invasive species is defined as a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic concern or environmental harm or harm to human health (EO 13112, signed February 3, 1999).

Noxious weeds and invasive species occur on surface acres within the affected areas. Downy brome (cheatgrass), halogeton and other annual weeds are common along roadsides and on other disturbed areas. Russian knapweed, hoary cress, perennial pepperweed, tamarisk and various thistles (Canada, musk and scotch) are also known to occur in these areas.

Existing and new weed species have the potential to be introduced into newly disturbed areas. The inventory process is on-going to detect small, invasive populations as they begin to spread into and within the district. Once a population is found, the BLM coordinates with various agencies, lease operators and land users to implement treatment to control the infestation. For all actions on public lands that involve surface disturbance or rehabilitation, reasonable measures are required to prevent the introduction or spread of noxious weeds, invasive and non-native species. These measures may include power washing or air blasting of construction equipment to remove soil, oil and vegetative parts and requirements for using certified weed-free seed and weed-free hay, mulch and straw. In addition, any actions that result in the introduction or spread of noxious weeds, invasive and non-native species would be mitigated by standard weed management guidelines under the direction of the BLM.

Environmental Consequences

Based on the RFD, oil and gas exploration or production activities are expected to disturb a total of 50-100 acres over a ten year period. The proposed action would authorize leasing, which has the potential, through site-specific analysis to lead to the authorization of exploration and development activities such as roads and drill pad construction. These subsequent activities would provide a mode of transport for noxious weeds, invasive and non-native species to become established. Oil and gas exploration and development may include staging, construction, maintenance and the use of motorized vehicles for transportation of personnel and equipment, which may increase the potential for new and expanded infestations. Wind, water, recreation vehicles, livestock and wildlife would also assist with the distribution of weed seed into the newly disturbed areas. If parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

To prevent the spread of noxious weeds, invasive and non-native plant species, at the APD stage, the operator would be required to control any noxious weeds, invasive and non-native species that become established within the disturbed areas involved with drilling and operating the well and continue weed control actions throughout the life of the project.

3.4.8 Geology and Minerals

Affected Environment

The geologic history of central and southern Nevada and the assessment area is very complex and includes two major cycles of sedimentation (western and eastern facies sources), episodic thrust faulting, mountain building, and associated intrusive and igneous activity. More recent geologic history includes a period of crustal extension that was accompanied by bimodal (rhyolite-basalt) volcanism, large volume caldera volcanism, and basin and range block-faulting resulting in high-levels of shallow crustal heat flow. The regional and local geologic setting has been instrumental in the location of and potential for numerous economic metallic mineral deposits in the assessment area, as well as development of economic geothermal resources.

As summarized in Mineral Assessment Report January 2012, the assessment area is located in the Great Basin portion of the Basin and Range physiographic province of the western United States. Faults bound each of the mountain ranges and cut them and the basins between them. The ranges are the result of multiple geologic events, including the Late Devonian/Early Mississippian Antler orogeny, the Early Triassic Sonoma orogeny, and the Jurassic Nevadan and Sevier orogenies. The Basin and Range province extends west to the Sierra Nevada and Cascade Ranges in California and Oregon, and east to the Wasatch Mountains in Utah

The Oil and Gas Lease area projected for sale in the MLFO is bounded by the Desatoya Mountains and the Tobin Range on the west and Diamond Mountains and Sulphur Spring Range on the east. The proposed parcels in the TFO are located within three valleys: the Big Smoky Valley, which is bounded by the Toquima and Monte Cristo Ranges to the east and the Toiyabe and San Antonio Ranges to the west; the Ione Valley, which is bounded by the Cedar Mountain Range to the west, the Royston Hills to the south and the Toiyabe Range to the east; and the Big Sand Springs Valley, which is bounded by the Pancake Range to the east and the Hot Creek Range to the west. The BMD is located in the Basin and Range province. The Basin and Range province is comprised of north-south oriented mountain ranges separated by broad valleys, which covers most of Nevada. These mountains were formed by crustal blocks that moved relatively upward along parallel normal faults. Basins, or valleys, were formed by fault-bounded crustal blocks that moved relatively downward. Many of these faults are still active and earthquakes can occur. BMD geology has been deformed by successive mountain building events and extensive volcanic activity has occurred. There are no geothermal plants in the proposed lease parcels. There are six proposed parcels that lie within mine plan areas.

A variety of rock types can be found within the BMD. These rock types include: Lower Paleozoic sedimentary and volcanic rocks, Tertiary volcanic rocks, Upper Tertiary volcanic rocks and Quaternary alluvial and playa deposits. The Paleozoic and Mesozoic rocks include high quality limestone that is mined near the assessment area. Mississippian Chainman Shale is thought to be the major source for petroleum generation in both Railroad and Pine Valleys (Grabb 1994). Traps are created by faulting and hydrothermal or contact metamorphism has altered organic matter contained in marine shales.

Locatable Minerals

Locatable minerals historically or currently mined within the assessment area include metallic minerals (*i.e.*, gold, silver copper, mercury, zinc, molybdenum, manganese, uranium, and

tungsten and industrial minerals (*i.e.*, limestone, barite, gypsum, diatomaceous earth, sulfur, and fluorspar). Currently, there are four open pit gold/silver mines (Ruby Hill, Cortez Hills/Pipeline, Phoenix, and Round Mountain). Industrial mineral mines operating in the assessment area include two barite producers *(Argenta and Greystone Mines), lithium compounds (Silver Peak Operation), and* diatomite (Basalt Mine). Approximately 23 mining plans of operation are currently administered by the BMDO. A total of 2,507 mining notices (as of 1 January 2012) have been administered by the BMDO since 1990 and 18 are currently pending decisions. The US Geological Survey (USGS) has identified over 1400 mines and prospects in the state of Nevada, approximately 446 of which fall within the four counties in the BMD.

The potential that oil and gas interests may overlap with those of mineral exploration exists. However, based on past experience in Nevada most of the lands that are used for oil and gas exploration and production would be reclaimed within ten years. The majority of oil and gas exploration and development would be short-term and hence would not appreciably affect mineral exploration and development. Since locatable mineral operation plan boundaries exist within 6 parcels that were nominated for sale, these are proposed for deferral at this time. These parcels include 116,118, 128,143,160, and 161.

Saleable Minerals

Saleable minerals can only be acquired by purchase. They include, but are not limited to, the following: petrified wood, common varieties of sand, stone, gravel, pumice, pumicite, cinder, clay and rock. The most common are sand and gravel deposits. Gravel deposits are associated with colluvium, which was eroded off the mountain ranges. Other types of deposits include topsoil and sand. The minerals program administers 39 active sales and 175 free-use permits. Saleable mineral sites with a priority for use include sand, gravel, and rock quarries located along State, County, and BLM managed roads. These types of saleable minerals are distributed throughout the BMD, but there is no ongoing major exploration for saleable minerals or active mining on the proposed lease parcels.

Prior history in Nevada shows that oil and gas exploration and development activities would require up to 2.5 acres in gravel pit expansion. This small acreage would not greatly increase the amount of gravel pits, nor would it burden the communities that utilize gravel.

Leasable Minerals

Leasable minerals are those that may be extracted from leases on public lands and are subdivided into solid and fluid leasable mineral groups. Solid minerals include the following: coal, sodium, potassium and phosphate (and under certain conditions, sand, gravel and locatable minerals). Fluid minerals include oil and gas and geothermal resources.

In Nevada, oil and gas wells are typically associated with elevated water temperatures (approximately 160°F or higher) and conflicts may arise between geothermal and oil and gas exploration development. Should such situations arise, these potential impacts could be mitigated through negotiations between operators.

Oil and Gas

Knowledge of existing geology of the assessment area, as it relates to oil and gas occurrences, is based on bedrock geologic mapping, detailed basin analysis (Anna *et al.* 2007), and oil and gas test wells drilled in the assessment area. Detailed bedrock geologic maps of 1:250,000 quadrangles were compiled by the USGS by county and are available as electronic files from the Nevada Bureau of Mines and Geology. Oil and gas fields in the BMD occur in Railroad Valley and Pine Valley located in central Nevada. Oil and gas in Railroad Valley occurs mainly in Miocene and younger age basins formed during the Basin and Range Orogeny. Hydrocarbon traps are stratigraphic and structural in nature. The majority of oil and gas are trapped in the fractured, Oligocene age volcanic rocks and are believed to be sourced from deeper Cretaceous and early Tertiary marine sediments. Most of the oil produced in the assessment area is low in gravity. Gas production in the assessment area is negligible and constitutes only about 0.05 percent of all produced hydrocarbons. Pine Valley oil production comes primarily from Oligocene and Miocene sedimentary and volcano sedimentary rocks, but rocks as old as the Devonian Telegraph Canyon Formation host oil in the assessment area.

The oil and gas program currently consist of drilling wildcat wells and exploratory based production wells on existing oil fields in the Railroad Valley. A total of 1,565 leases totaling 2.5 million acres have been authorized since 1990. Since 1954, 771 oil and gas wells have been drilled in the BMD. Total hydrocarbon production from 1950 to 2011 is 50.1 million barrels of oil and 347,734 million cubic feet (MCF) of gas. Oil production in 2012 amounted to 367,717 barrels of oil (BLM Final Mineral Assessment Report 1/2012)

Oil Shale

The outlook for production of petroleum products from oil shale within the assessment area is poor in the short-term and probably poor in the long-term. Oil shale contains significant crude oil and may be used as a source of petroleum although the economics of the process is not very attractive at this time. Oil shale production will require a very large resource, access to energy, and access to large volumes of water. Oil shale has been reported in the Chainman Formation (Mississippian), Vinini Formation (Ordovician), Woodruff Formation (Devonian), Sheep Pass Formation (Eocene), and the Elko Formation (Eocene-Oligocene) are potential sources of oil shale (Anna *et al*, 2007). The Chainman, Vinini, Woodruff, and Sheep Pass Formations all occur within the assessment area. The Sheep Pass Formation hosts some oil in the Railroad Valley area. The Elko Formation may occur within the BMD in the lower stratigraphy of Pine Valley but the bulk of the Elko Formation is northeast of the BMD. Oil production was attempted from the Elko Formation from 1917 to 1924 (Garside 1983) but was unsuccessful because of low yields and poor product quality. No other attempts have been made to exploit oil shale in Nevada. (BLM Final Mineral Assessment Report 1/2012)

Geothermal

All land within the assessment area is open to geothermal leasing and development with exception of Wilderness Areas, Wilderness Study Areas, community watersheds, critical wildlife habitat areas, and military reservations. Geothermal energy resource exploration and development has increased in the past four years. The assessment area currently has 70 authorized geothermal leases, covering 148,441 acres, and 3 pending geothermal applications, covering 3,654 acres. The MLFO prepared a “Programmatic Environmental Assessment Geothermal Leasing and Exploration - Shoshone- Eureka Assessment area” in 2002. The Tonopah Field Office (TFO) implemented the “Proposed Tonopah RMP and Final

Environmental Impact Statement" (1994) and a programmatic Environmental Assessment for geothermal leasing to expedite processing geothermal lease applications. In addition, The Geothermal Programmatic Environmental Impact Statement (PEIS) for Geothermal Leasing in the Western US was approved on December 17, 2008 to expedite processing geothermal lease applications. About 20 percent of the land within the Battle Mountain District is potentially valuable for geothermal resources, located mainly in Esmeralda and Lander counties. Pending lease applications cover less than one percent and are near the town of Carvers in Nye County and in Crescent Valley in Lander County. The current geothermal program includes six exploration projects and three production/utilization projects in the Mt Lewis Field Office and Tonopah Field Office assessment areas.

Existing Geothermal Fields and Development of Resources

Beowawe

The Beowawe geothermal field is on the border of Eureka and Lander Counties, on the border of the assessment area. The project currently generates 17.7 megawatts. The Beowawe geothermal power station is owned by Terra-Gen Power and started producing energy in 1985.

Jersey Valley Geothermal Project

Jersey Valley Geothermal Project has an approved Power Purchase Agreement and is now online producing 15 megawatts. The Jersey Valley geothermal project is owned by Ormat Technologies Co. and is located in a remote area in both the Lander and Pershing Counties of Nevada.

McGinness Hills Geothermal Project

The McGinness Hills Geothermal Project is located in a remote area in Lander County and is currently generating 48 megawatts. The project is owned by Ormat Technologies Co. The project has an approved Power Purchase Agreement and is currently building the second power plant which will generate another 48 megawatts of energy.

There are no offered oil and gas lease parcels that overlap current geothermal operations. Any issues that may arise could be mitigated by negotiation between the operators.

Environmental Consequences

The potential that oil and gas interests may overlap with those of mineral exploration exists. However, the majority of acres that may be used for oil and gas exploration and production are usually reclaimed within ten years. In most instances, oil and gas exploration and development are short-term endeavors and hence would not appreciably affect mineral exploration and development. Agreements between oil and gas and mineral operators could help to mitigate those acres that would be used for oil and gas production on a more long-term basis.

Oil and gas exploration and development activities could require up to 2.5 acres in gravel pit expansion. This small acreage would not greatly increase the amount of gravel pits, nor would it burden the communities that utilize gravel.

In Nevada, oil and gas wells are typically associated with elevated water temperatures

(approximately 160°F or above) and conflicts may arise between geothermal and oil and gas exploration development. There are currently no geothermal leases that overlap proposed oil and gas lease sale parcels. These potential impacts could be mitigated through negotiations between operators.

If parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

3.4.9 Soils

Affected Environment

Differences in climate, relief, aspect, slope, landform, elevation and parent material among other factors contribute to the formation of different soil types. High variability of these factors within the project area creates a wide variety of soil types. Soils within the project area range from those typical in the valley floors that tend to be deep, poorly drained due to high clay content and highly alkali to those common in the higher mountain elevations which tend to be shallow young gravely soils with near neutral pH.

Existing soils surveys of the project area are used to for evaluating land-use potential, potential plant communities and developing reclamation and rehabilitation plans. Three major soil orders dominate the soil types in the project area these are: Aridisols, Entisols and Mollisols. A brief description of each soil order is provided below.

Aridisols

Aridisols are soils that are too dry for the growth of mesophytic plants. The lack of moisture greatly restricts the intensity of weathering processes and limits most soil development processes to the upper part of the soils. These soils often accumulate gypsum, salt, calcium carbonate, and other materials that are easily leached from soils in more humid environments. They have properties typical of soils in arid regions and are low in organic matter. Aridisols are mainly found in valley bottoms, but may occur at higher elevations. They do not have water continuously available to them during the growing season and typically have a water stress period of about 3 months. Aridisols tend to be finer in texture than the other two orders.

Entisols

Entisols are found on recent landscapes, such as alluvium and disturbed sites. Soil texture tends to be more gravely and well drained. These are mineral soils that are very young and have not yet developed appreciable accumulations of soluble salts and lime. Soil horizon development is typically minimal. They occur in both the valley bottoms as well as the mountains. In the mountains these tend to make up the steeper more erodible soils whereas lower elevation they tend to be found in areas of deposition such as alluvial fans and floodplains. Thought these sites are typically xeric however, they are not as dry as the Aridisols.

Mollisols

Mollisols are found on dark-colored fertile surface horizons that have been formed under semiarid to sub-humid climate. Moisture availability is typically the highest in this type than the other two. These soils are rich in organic matter and are very fertile. In the project area, these

soils mainly form in the mountains with grass communities. These soils are older and generally occur on more stable alluvial fans and terraces.

Microbiotic Crusts

Microbiotic crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria found throughout the Great Basin and Project Area. Cyanobacterial and microfungi filaments weave through the top few millimeters of soil, gluing loose particles together and forming a matrix that stabilizes and protects soil surfaces from erosive forces. Microbiotic crusts retain soil moisture, discourage invasion by annual species, reduce win and water erosion, fix atmospheric nitrogen and contribute to soil organic matter. These crusts can be impacted by surface disturbing activities. The Greater the disturbance the Greater the impact and time associated with recovery. Microbiotic crusts can also be indirectly impacted from increased erosion, whether eroded away or covered by soil from win or water events. Slight covering by soil does not affect microbiotic crusts (Technical reference 1730-2, 2001).

Environmental Consequences

There would be no direct impacts from issuing new oil and gas leases because leasing does not directly authorize oil and gas exploration and development activities. However, it is reasonably foreseeable that oil and gas exploration and development would occur within the next 10 years. Direct impacts from these activities would be analyzed under separate site-specific EAs.

Within the next ten years, it is predicted that 50-100 acres would be disturbed by activities associated with oil and gas exploration and production including seismic lines, exploration wells, production wells, road construction, and gravel pit expansion. These actions would remove vegetation potentially increasing wind and water erosion, cause soil compaction and disturb microbiotic crusts. Removal and crushing of vegetation would occur through exploration and development activities. Removing the vegetation would increase the susceptibility of soils to erosion by wind and water. Additionally, these activities would compact soils and disturb microbiotic crusts. Considering the amount of disturbance in the RFD, the impacts to soils are expected to be comparatively minor when compared to the areas offered for lease (256,401 acres) and temporary in nature because the majority of the disturbance would be reclaimed. Any plan for exploration or development would require a site specific NEPA analysis. Through this process, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity.

3.4.10 Vegetation

Affected Environment

Vegetation within the proposed lease area provides forage and cover for wildlife, livestock, wild horses and burros within the project area. It also provides ground cover and root mass to stabilize soils and aids in infiltration of water into the ground. The type of vegetation that grows in a particular area depends largely on soil types and average precipitation. The Natural Resource Conservation Service completed soil surveys and has developed ecological site descriptions from the information collected. Each ecological site description provides detailed information regarding vegetative communities and precipitation zones and is used for evaluating

land-use potential, potential plant communities and developing reclamation and rehabilitation plans. The following vegetative communities are those identified within the lease parcel area and are discussed in detail below. Notably several plant species in the BMD have been identified as SSS (Appendix D). These occur in several of the vegetation communities described here.

Greasewood

This community occurs on floodplains and closed-basin bottomlands adjacent to playas. Greasewood is located on slopes that range from 0-2% with an elevation between 4,500-5,000 feet and occur in precipitation zones of 3-5 and 5-8 inches. Vegetation in this type is normally restricted to mounded areas that are surrounded by playa-like depressions or nearly level, usually barren, interspaces. This plant community is characterized by black greasewood (*Sarcobatus vermiculatus*), Basin wildrye (*Leymus cinereus*), inland saltgrass (*Distichlis spicata*) and alkali sacaton (*Spordolus airoides*). Saltgrass may extend into the interspace in some areas. Potential vegetative composition is typically 25% grasses, 5% forbs and 70% shrubs.

Salt Desert Shrub

This vegetative community occurs on alluvial terraces, fans and foothills on all aspects. Salt desert shrubs are located on slopes that range from 0-30%, with 0-8% slopes the most typical. Salt Desert Shrub occurs at elevations between 4,500-6,000 feet and within precipitation zones of 3-5 and 5-8 inches. The plant community is characterized by shadscale (*Atriplex confertifolia*), bud sagebrush (*Artemisia spinescens*) and some winterfat (*Krascheninnikovia lanata*). Bud sagebrush and winterfat are palatable salt desert shrub species. Bottlebrush squirreltail (*Elymus elymoides*) and Indian ricegrass (*Achnatherum hymenoides*) are key grass species associated with this vegetative community. Alkali meadows are included in this plant community and consist of inland saltgrass and basin wildrye. Potential vegetative composition is typically 10% grasses, 5% forbs and 85% shrubs.

Big Sagebrush

This is the most extensive community within the lease parcel area, which occurs on terraces, alluvial fans and low rolling hills on all exposures. Wyoming and Big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*; *Artemisia tridentata* ssp. *tridentata*) occurs on slopes that range from 2-50 percent with elevations ranging from 4,500-6,000 feet and within the 8-12 inch precipitation zone. This plant community is characterized by Wyoming and Basin big sagebrush, Thurber's needlegrass (*Achnatherum thurberianum*), Indian ricegrass, Basin wildrye, bottlebrush squirreltail and Sandberg's bluegrass (*Poa secunda*). Arrowleaf balsamroot (*Balsamorhiza sagittata*) and Tapertip hawksbeard (*Crepis acuminata*) are important forb species associated with this vegetation type. Potential vegetative composition is typically 50 percent grasses, 15 percent forbs and 35 percent shrubs.

Black Sagebrush

This vegetative community occurs on low arid foothills, mountain side slopes and plateaus. Black sagebrush (*Artemisia nova)* occurs on slopes that range from 4-50% with elevations ranging from 5,000-7,000 feet and are associated with the 4-8 inch precipitation zone. Soils are often shallow over a calcareous pan, which limits effective water holding capacity and seeding success. Vegetation that characterizes this community consists of black sagebrush, bottlebrush

squirreltail and Sandberg's bluegrass. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is characteristic for communities that occur in the higher elevations. Potential vegetative composition is typically 50% grasses, 15% forbs and 35% shrubs.

Low sagebrush

This vegetative community occurs on mountain side slopes and plateaus. Low sagebrush occurs on slopes that range from 4-75% with elevations ranging from 5,000-9,000 feet and are associated with the 8-12 inch precipitation zone. Soils are often shallow over a calcareous pan, which limits effective water holding capacity and seeding success. This vegetative community is characterized by low sagebrush (*Artemisia arbuscula*), bottlebrush squirreltail, Sandberg's bluegrass and bluebunch wheatgrass. Potential vegetative composition is typically 50% grasses, 15% forbs and 35% shrubs.

Mountain Brush

This community occurs on upland terraces and inset mountain valleys on all slope aspects. Mountain brush occurs on slopes that range from 4-50% with elevations ranging from 6,000-9,000 feet. These communities generally occur within the 12+ inch precipitation zone. The vegetative community is characterized by Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass, snowberry (*Symphoricarpos albus*), antelope bitterbrush (*Purshia tridentata*) and serviceberry (*Amelanchier utahensis*). Mountain brome (*Bromus carinatus*), mountain spray (*Holodiscus discolor*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) are other species associated with this community. Potential vegetative composition is typically 55% grasses, 15% forbs and 30% shrubs.

Pinyon-Juniper Woodlands

This community occurs on upper alluvial fans and in the higher mountainous regions with slopes ranging from 30-50%. Elevations range from 5,500-9,000 feet. This community occurs within the 10-22 inch precipitation zone. Lower elevations (5,000-6,500 feet) communities are dominated by juniper, mid elevations (6,500-7,500 feet) by both pinyon and juniper and high elevations (above 7,500 feet) are predominately pinyon pine. These plant communities are characterized by single-leaf pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*). There are localized ecosystems which support other juniper species such as common juniper (*Juniperus communis*) and Rocky Mountain juniper (*Juniperus scopulorum*). The understory, although sparse, consists of bluebunch wheatgrass, Sandberg's bluegrass, Thurber's needlegrass, basin wildrye and needleandthread grass (*Hesperostipa comata*). Juniper and pinyon trees dominate these areas; however, mountain big sagebrush, antelope bitterbrush and curl-leaf mountain mahogany can be found within the community. Heavily wooded areas provide little forage and have a large amount of bare ground. Potential vegetative composition is typically 40% grasses, 15% forbs and 45% shrubs and trees.

Riparian

Small riparian communities occur within the project area and are associated with streams, springs and seeps where water is at or near the surface for the majority of the year. Species associated with this community include willow (*Salix* spp.), quaking aspen (*Populus tremuloides*), cottonwoods (*Populus fremontii*, *P. Balsamifera* ssp. *Trichocarpa trichocarpa, augustifolia*), water birch (*Betula occidentalis)*, red-osier dogwood (*Cornus sericea*), rushes

(*juncas* ssp.) and sedges (*Carex* ssp.) and cattail (*Typha latifolia*). Potential vegetative composition is typically 70% grasses and grass like species, 25% forbs and 5% shrubs.

Winterfat Bottoms

Winterfat communities occur generally in flats of drainage and flood plains. They typically occur in areas where slopes range from 0-2%. The elevation of this community ranges from 4000-6000 feet and within precipitation zones of 5-8 inches. Soils are typically sandy loam. The plant community is characterized and dominated by winterfat. It also includes vegetation such as bud sagebrush, Indian ricegrass and squirreltail. Potential vegetative composition is typically 10% grasses, 5% forbs and 85% shrubs.

Annuals

Although this vegetation type is not considered an ecological type, it is a plant community that accounts for portions of the project area. Areas that have been disturbed may be invaded by invasive annual species, sometimes to the exclusion of native species. Dominant plants are cheatgrass (*Bromus tectorum*) and/or halogeton (*Halogeton glomeratus*). Other plants often present in these areas are Russian thistle (*Salsola kali*), clasping pepperweed (*Lepidium perfoliatum*), tumble mustard (*Sisymbrium altissimum*) and Russian knapweed (*Centaurea repens*).

Environmental Consequences

There would be no direct impacts from issuing new oil and gas leases because leasing does not directly authorize oil and gas exploration and development activities. However, it is reasonably foreseeable that oil and gas exploration and development would occur within the next 10 years. Direct impacts from these activities would be analyzed under separate site-specific EAs.

Within the next ten years, it is predicted that 50-100 acres would be disturbed by activities associated with oil and gas exploration and production including seismic lines, exploration wells, production wells, road construction, and gravel pit expansion. The exploration and development activities would require the removal of vegetation. It is anticipated that the majority of the exploration is likely to occur in saltbush shrub or sagebrush type vegetation areas, rather than pinyon-juniper woodlands. Removal of vegetation would increase the amount of bare ground, thus increasing wind and water erosion, increase the potential for invasion by nonnative and noxious species, reduce the capability for water to infiltrate the ground, and increase runoff and sediment loading. Sediment loads could impair waters affecting aquatic species and habitat. Decreased infiltration and increased runoff may reduce the amount of available water in the soil for vegetation to establish. Based on the RFD, impacts to vegetation from exploration/development are expected to be relatively minor, short term, and localized. In addition, site-specific mitigation measures, BMPs, and COAs would be implemented to reduce impacts.

3.4.11 Range Resources

Affected Environment

Livestock production is a major industry within the BMD. Within the BMD the Range Program permits and manages public land grazing on 91 allotments for 88 permittees and approximately 366,946 Animal Unit Months (AUMs). An AUM is the amount of forage necessary for the sustenance of one cow or its equivalent for a period of one month. Nine grazing allotments

include all or portions of the parcels proposed for leasing (Figure 3). Most grazing allotments are comprised of both public and private lands; however, the majority of the allotments are dominated by public lands. Grazing permits are issued to qualified individuals or entities that specify livestock numbers, season of use, kind of livestock and number of AUMs allowed for use. Other terms and conditions may be added to grazing permits for the orderly management of the permit and/or the livestock within an allotment(s). Each allotment may have one or multiple permittees. Various range improvement projects are also located within these allotments and may include: fences, cattle guards, troughs, wells, pipelines, seedings, and vegetation manipulation projects.

The following table (Table 4) shows the allotments within the Project Area, the public acres within the allotment, the number of acres of offered lease parcels within each allotment, the number of authorizations/permittees within each allotment, the kind of livestock authorized and Active AUMs.

Table 4. Grazing allotments within the Lease Area

Allotment Name	Total Allotment Public Acres	Lease Parcel Acres	# of Authorizations	Kind	Total AUMs
Arambel	46,969	1,114	1	Sheep	1,349
Fish Creek Ranch	289,353	7,827	3	Sheep, Cattle	4,815
Hunts Canyon	101,971	18,263	1	Cattle	2,237
Ione	194,678	57,340	3	Sheep, Cattle	6,808
Monte Christo	508,770	4,408	1	Cattle	9,352
Ralston	380,250	31,756	0	-	-
San Antone	422,288	122,963	1	Cattle	13,505
Stewart Spring	17,072	105	1	Cattle	535
Stone Cabin	391,205	21,103	2	Cattle	13,963
Total	**2,352,556**	**264,879**	**-**	**-**	**52,564**

The Ralston Allotment currently does not have any active authorizations.

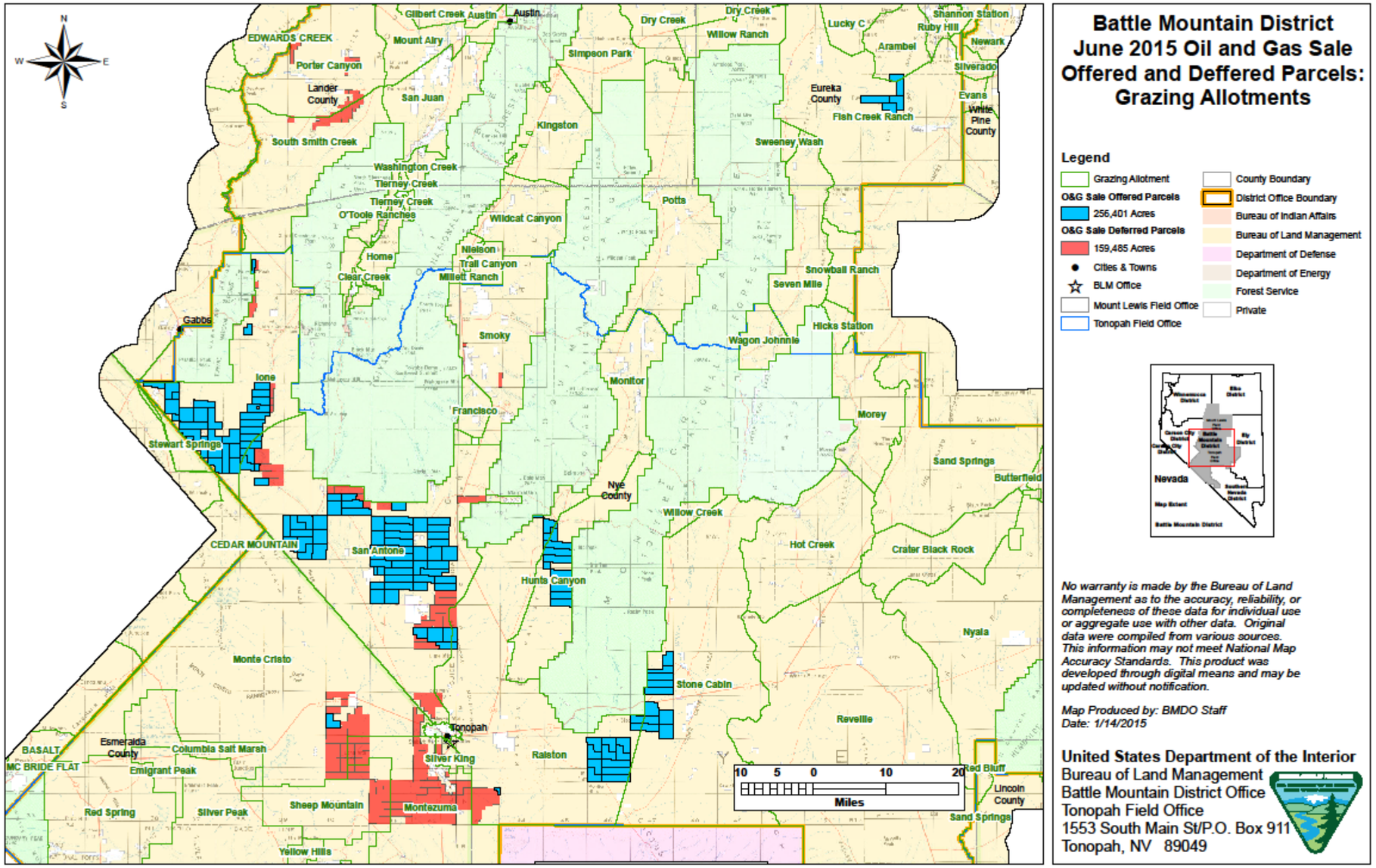

Figure 4 - Grazing Allotments in the June 2015 Lease Sale Area

Environmental Consequences

There would be no direct impacts from issuing new oil and gas leases because leasing does not directly authorize oil and gas exploration and development activities. However, it is reasonably foreseeable that oil and gas exploration and development would occur within the next 10 years. Direct impacts from these activities would be analyzed under separate site-specific EAs.

Within the next ten years, it is predicted that 50-100 acres would be disturbed by activities associated with oil and gas exploration and production including seismic lines, exploration wells, production wells, road construction, and gravel pit expansion. The removal of vegetation would temporarily decrease the amount of available forage for wildlife, livestock, wild horses and burros. This may reduce the number of AUMs available for grazing, thus decreasing the amount of livestock or the time that livestock could forage within the allotment. The potential decrease in livestock would coincide with the area of disturbance and are expected to be temporary and comparatively small in size. Exploration and production activities could also have a temporary effect on grazing patterns by shifting and/or intensifying livestock grazing in other areas. Any plan for exploration or development would require a site specific NEPA analysis. Through this process, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity.

3.4.12 Lands and Realty

Affected Environment

All of the proposed lease parcels are located on public lands with federally controlled surface and subsurface mineral estate. Many of the offered parcels would require a right-of-way (ROW) in order to access the lease parcels. Some proposed parcels include pre-existing land use authorizations such as grants, leases, permits and withdrawals. Table 5 provides a summary of the land use authorizations in the lease area.

ROW Case File	ROW Holder	ROW Description	Affected Lease Parcel
N-89652	Nye County Road Dept	100-ft wide road in sections	001, 002, 004, 005, 008, 015, 016. 017, 020, 026, 027, 037, 038, 041
N-88866	Sierra Pacific Power Company dba NV Energy	25-ft wide distribution line	002, 003, 005, 006, 007, 014, 024, 026, 036, 037, 040
N-82037	Ward Enterprises	10-ft wide access road; waterline, water treatment facility, 3-phase powerline, well sites, 8-ft chain link fence.	004
N-90166	Nye County Road Dept	100-ft wide road in sections	012, 013, 020, 022, 023, 027, 028, 029, 031, 032, 033
N-54894	Nye County Road Dept	RS 2477 road – varied width	028, 029, 031, 032
N-83054	Nye County Free Use Permit	Mineral Material Site	030
N-04807	Nevada Department of Transportation	400-ft wide road- SR 361	035
N-90167	Nye County	100-ft wide road in sections	043, 044, 089, 091, 092, 096, 100, 101, 102, 103
N-89608	Geothermal Lease		064, 065
N-56304	FHWA	60-ft wide access road to mineral material site	064

ROW Case File	ROW Holder	ROW Description	Affected Lease Parcel
Nev 043264	Sierra Pacific Power Company dba NV Energy	100-ft wide, 55 kV transmission line	064, 137, 138, 140, 141, 147, 148, 149, 151, 152
N-25341	Sierra Pacific Power Company dba NV Energy	140-ft wide, 230 kV transmission line	093, 094, 137, 140
N-81418	Nye County Free Use Permit	Mineral Material Site	105
N-40049	USGS	Monitoring Well	103
Nev 055173	Truckee River Ranches	RS 2339 D/C	145, 146, 147
N-89651	Nye County Road Dept	100-ft wide road in sections – Belmont Road- Nye Cnty #745	168, 169
N-78094	Nye County Road Dept	200-ft wide road in sections – Belmont Road	169
N-06379	BLM	Public Water Reserve 107	170
N-04436	Sierra Pacific Power Company dba NV Energy	40-ft wide, 55 kV transmission line	173, 178, 179, 180
Nev 052668	USAF-DOE	400-ft flight line area, Mud Lake, NE of Tonopah. High speed flight lines.	173, 178, 180, 181
N-43920	Nevada Department of Transportation	200-ft wide, RS 2477 road from US 6 to TTR	179, 182, 183
NVCC 020093	Nevada Department of Transportation	400-ft wide, Nye Cnty Rt 4 to Forest Boundary	183
Nev 061469	Sierra Pacific Power Company dba NV Energy	30-ft wide, 69 kV transmission line – Warm Springs to Hot Creek	184
N-57185	Roy Clifford	RS 2339 D/C	189
N-40237	USGS	Monitoring Well	189

Table 5. A summary of the Rights-of-Way (ROWs) in the Lease Area.

Additionally, grants, leases and permits may be authorized prior to any proposals for exploration by an oil and gas lessee. In these instances, the holder of land use authorization would have a valid existing right to the authorized use of public lands within the lease.

Environmental Consequences

Leasing creates a valid existing right, which could conflict with other existing or future land use authorizations. These conflicts would be mitigated through agreements between relevant operators.

Applications for ROW's may be required for roads for oil and gas exploration and production activities. These off-lease ROW's would be non-exclusive where possible, that is, they can be used by the general public for other purposes such as access to public lands.

Impacts to existing ROW's may occur as a result of disturbance activities associated with potential exploration and development activites such as road construction. These impacts may cause temporary disruptions to ROW holders, but the Federal Land Policy and Management Act (FLPMA) requires that prior existing rights must be recognized. If parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

3.4.13 Visual Resources

Affected Environment

BLM Manual Series 8400 outlines the visual resource management (VRM) program. The BLM assigns VRM classes to public lands through the land use planning process. Lands are assigned a class ranging from one to four, with one containing the highest visual values and four containing the lowest values. Attempts are made to mitigate visual contrasts from surface-disturbing activities regardless of the VRM class assigned. The offered parcels have six parcels classified as Class III and the remaining parcels are Class IV.

Environmental Consequences

Based on the RFD, oil and gas exploration or production activities are expected to disturb a total of 50-100 acres over a ten year period. No impacts to visual resources on public lands would occur as a result of the oil and gas lease sale. The purchase of a parcel does not guarantee that a parcel will be developed for oil and gas resources in the future. However, if parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COA for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

If an APD is received for a purchased parcel, subsequent NEPA would be required in order to analyze site-specific impacts to visual resources on public lands. Potential impacts may include, but are not limited to: contrast of line, shape, color, or texture due to the emplacement of roads, drill pads, drill rigs, tank batteries, temporary and long-term facilities and pump jacks.

Potential methods to reduce impacts to visual resources on public lands include, but are not limited to: moving drill site locations up to 200 meters, use of low profile tanks, coloring facilities and equipment, road alignment, reducing the size or changing the configuration of drill pads and utilizing topographic features to visually screen facilities. At the conclusion of activities related to oil and gas development, reclamation of the drill site would be required. Potential reclamation may include, but is not limited to: re-contouring drill pads, reclaiming roads, re-seeding drill sites and roads and the removal of equipment and facilities related to oil and gas development.

The utilization of the outlined mitigation and reclamation methods, as well as any others identified at the APD stage, have the potential to minimize impacts to visual resources on public lands to the greatest extent practicable.

3.4.14 Recreation

Affected Environment

The proposed lease parcels are all within dispersed recreation areas subject to public use. Dispersed recreation areas are areas that are used by recreationists as they desire. Activities including sightseeing, pleasure driving, rock collecting, photography, hunting, four-wheeling, hiking and bird watching occur in dispersed recreation areas. The lease area is used by the public for camping, hunting, hiking and other outdoor recreation activities.

Environmental Consequences

The following are potential environmental impacts on recreation considering the RFD scenario.

During the exploration phase, survey and drilling crews are likely to use available access roads and trails in the District that are also used for recreation access. The survey activities conducted during the exploration phase are likely to minimally impact recreation, if at all, due to the short duration, small crew size and temporal nature of the surveys and drilling of wells as well as the dispersed nature of recreation activities in these areas. However, if parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

Potential exploration activities may include construction. At this time, access roads and well pads may be constructed. Increased truck traffic during this phase could affect recreation due to increased noise and dust levels and could cause temporary delays or closures on access roads. Construction sites are likely to have limited access to the public which could, in turn, slightly decrease access to the area for recreation.

The production stage may include operation and maintenance of the constructed facilities. These activities require a small number of employees who would utilize access roads in the area but are not likely to limit the recreational use of these roads. Oil and gas production facilities are likely to have limited access to the public; however, improved access to the area for recreation may be available because of the maintained access road to the production facility.

Some parcels or portions of parcels were proposed for deferral based on existing or pending recreation conflicts such as: existing recreational facilities, areas proposed for extensive recreation areas or lands with wilderness characteristics being considered during the BMD Resource Management Plan Revision. Please refer to Appendix C for a list of deferrals.

3.4.15 Socioeconomics

Affected Environment

The proposed lease parcels are located within three counties in Central Nevada: Eureka, Esmeralda, and Nye Counties. The primary economic activities that contribute to the economic base for lands within the lease area are mining, agriculture and recreation. All three counties offer rural lifestyles with less than 3 persons per square mile.

Eureka County

Eureka County is a rural county. The Eureka County economy is primarily dependent on ranching, agriculture, and mining (Eureka County 2011a). Demand for energy and precious metals has historically bolstered economic activity through the production of gold. Eureka County, at just under 2,000 people, has the second smallest population of any county in the state of Nevada. Population density as of 2010 was estimated at around 0.5 people per square mile and the median household income was $61,472 as per 2005-2009 average.

Nye County

The majority of the proposed lease parcels are located within Nye County. Nye County's total population, according to the 2010 Census, is approximately 43,946 with a population density of 2.4 persons per square mile. The median household income is $39,150 with 20.1 percent of the population living below the poverty level.

Esmeralda County

Esmeralda County's total population, according to the 2010 Census, is approximately 783 with a population density of 0.2 persons per square mile. The median household income is $27,500 with 24.2 percent of the population living below the poverty level.

Environmental Consequences

The only direct effect of issuing new oil and gas leases on socioeconomics within the assessment area would be the generation of revenue from the sale of the leases as the State of Nevada retains 49 percent of the proceeds from lease sales. From March 2010 to July 2014 total revenue generated from both competitive and non-competitive oil and gas lease sales on the BMD was $2,411,377.

Subsequent oil and gas exploration, development and production could create impacts to the county economy in terms of additional jobs, income and tax revenues. During the exploration phase, oil and gas companies typically provide in-house scientists and technicians to do the majority of this work. After initial surveys have been completed, road building and drill pad construction could occur as a result of oil and gas exploration and development activities. Road and drill pad construction could be contracted to local contractors. Wells would typically be drilled over a period of time and not at the same time. The exploration crews, ranging from 20 to 30 people, would spend portion of their salary (approximately $200-$250 per person per day) in the local community for the duration of the project (four to eight weeks). The indirect impacts to socioeconomics within the assessment area from the proposed action based on above scenario would be minimal.

During development and production phase, the potential for socioeconomic impacts within the assessment area would be Greater. More permanent roads and drill pads would be constructed, along with associated support facilities and transmission lines. Typically, the majority of this work is supplied by local contractors. Additionally, local businesses may realize increased revenue from the purchase of supplies, meals, rooms, etc. Local trucking and delivery companies may also benefit economically by transporting supplies, building materials and oil products. Oil production from federal lands is subject to a 12.5 percent royalty payment to the federal government. Fifty percent of that amount is provided to the state government which then provides a portion back to the counties.

If parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COA for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

3.4.16 Wild Horse and Burro

Affected Environment

The Battle Mountain District administers 28 Herd Management Areas (HMAs) encompassing approximately 3.6 million acres of public land. Two other HMAs within the district boundary are administered by adjoining Districts. The BMD also cooperatively manages several United States Forest Service (USFS) Wild Horse Territories (WHTs). The estimated BMD population as of January 1, 2015 is approximately 6,000 wild horses and 450 wild burros.

HMAs are areas identified in Land Use Planning for long term management of wild horses or burros and are designated “Special Management Areas”. Many HMAs encompass mountain ranges and include mountain browse, meadow, mahogany and pinyon and juniper vegetation types interspersed with perennial streams and springs. Wild horses and burros also use sparsely vegetated, rocky terrain and habitat with limited water. Winter habitat typically consists of valley bottoms and lower elevations that may support winterfat or other salt desert shrub vegetation. The primary vegetation types used by wild horses consist of Wyoming or Mountain big sagebrush with an understory of perennial grass. Wild burros are able to thrive in more desert type conditions than wild horses. Wild horse and burro populations generally move throughout or between HMAs in response to a number of factors.

Wild horse and burro distribution throughout HMAs varies greatly throughout the year and is influenced by forage and water availability, precipitation, temperature, snowfall and other climatic factors, population size and resulting animal density (competition) and human disturbance caused from OHV use, roads, mining, exploration, recreation and other uses that occur on the public lands.

Water availability is a key influence to wild horse use and movement patterns, especially during summer months. Wild horses will generally travel much farther to water than will livestock. In many HMAs water sources are plentiful and supplied by perennial streams, springs and human constructed water developments such as livestock water tanks and ponds. In other cases, water sources are limiting and in drought years, wild horses may have difficulty accessing sufficient water, especially if the population exceeds the Appropriate Management Level (AML). In these cases, wild horse distribution is closely tied to the location of the available waters, which become very important to the health of the herd.

The average HMA population managed by the BMD is approximately 235 wild horses, with the average HMA size 114,300 acres. In some cases, wild horses do not fully utilize the entire HMA due to forage availability, water shortages, or human disturbance. Movement of wild horses between HMAs occurs where HMA boundaries are contiguous or near each other and when fences do not impede the interchange.

Management of wild horses and burros involves periodic inventory activities, typically completed with helicopter, as well as on the ground monitoring of habitat, animal health and distribution. The majority of wild horse foals are born between March 1 and July 1 annually. Burro populations may foal year round and may not increase at the same levels as wild horses. Throughout the BMD, populations increase by 10-22% annually. Appropriate Management Levels have been established for all HMAs administered by the BMD. When inventory and other data indicate that the AMLs have been exceeded, gathers are planned to reduce the populations within HMAs to the AML in order to prevent deterioration of the range associated with an overpopulation of wild horses or burros.

The Bureau of Land Management is responsible for the protection, management and control of wild horses and burros on public lands in accordance with the Wild Free-Roaming Horse and Burro Act of 1971 as amended (Public Law 92-195 Act) which states that BLM “shall manage

wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands."

The 2015 lease sale includes proposed parcels located within five wild horse HMAs. The following table provides an overview of the HMAs involved.

Table 6. Overview of HMAs within Proposed Parcels

HMA	Field Office	Acres	AML	Estimated Population
Desatoya[1]	Mount Lewis	161,678	180	174
Fish Creek		250,069	107-180	569
Paymaster	Tonopah	152,927	38	41
Saulsbury		135,977	40	182
Stone Cabin		407,601	364	332

Desatoya HMA

The Desatoya HMA is located eighteen miles west of Austin, Nevada in Lander and Churchill Counties. The MLFO portion of the HMA covers 136,524 acres and spans 18 miles wide by 24 miles long, south of US Highway 50. The Desatoya HMA is administrated by the Carson City District.

The Desatoya HMA is typical of the Great Basin region with steep north and south trending mountain ranges separated by large sweeping valley bottoms. The area consists of the Desatoya Mountain Range and varies in elevation from 9,900 feet at Desatoya Peak to 6,100 feet in Smith Creek Valley to the southeast and Edwards Creek Valley to the northwest.

The proposed parcels identified within the HMA are not located within areas heavily utilized by wild horses.

Table 7 displays the proposed lease sale parcels, as well as, the deferred parcels. Within the Desatoya HMA, 3 parcels exist as shown in the following table.

Table 7. Desatoya HMA Parcels

Parcel Number	Total Acres	Acres with HMA	Deferred
NV-15-06-048	1765	1765	Yes
NV-15-06-049	1367	1367	Yes
NV-15-06-078	1613	1572	No
Total Acres	4745	4705	3132

Fish Creek HMA

The Fish Creek HMA is located a few miles south of Eureka, Nevada, and is 25 miles wide and 28 miles long. The majority of the HMA is comprised of north-south trending mountain ranges that include all or portions of the Fish Creek Range, the Mahogany Hills, and the Antelope

[1] Most of the Desatoya HMA is located within the Mount Lewis Field Office but administered by the Carson City District. The acreage, AML and estimated population is for the entire HMA.

Range. Elevations range from 6,030 feet in the wide valley bottoms, reaching 10,100 feet at Ninemile Peak.

The HMA is bordered on the east by U.S. Highway 50 in part, and natural barriers and fences to the south. A small portion of the HMA exists north of U.S. Highway 50, which is separated by highway right-of-way fences. This portion of the HMA is approximately 19,300 acres and is managed with the Whistler Mountain and Roberts Mountain HMAs. The Fish Creek HMA shares its southern boundary with the Sevenmile HMA to the south west and the Pancake HMA (administered by the Ely District) to the south east.

Movement of the Fish Creek HMA wild horses is suspected to occur with the Sevenmile HMA to the south and with the Pancake Complex to the east, administered by the Ely District Office.

The offered parcels identified within the Fish Creek HMA are located within a portion of the HMA that is moderately to heavily utilized by wild horses.

Table 8 displays the proposed lease sale parcels, as well as, the deferred parcels. Within the Fish Creek HMA, 4 parcels exist as shown in the following table.

Table 8. Fish Creek HMA Proposed Parcels

Parcel Number	Total Acres	Acres with HMA	Deferred
NV-15-06-194	2556	2556	No
NV-15-06-195	2549	2549	No
NV-15-06-196	1918	1918	No
NV-15-06-197	1917	1917	No
Total Acres	8940	8940	0

Paymaster HMA

The Paymaster HMA is located 15 miles South West of Tonopah, Nevada in Esmeralda County. The HMA is located over the top of Lone Mountain and the Weepah Hills south of US highway 6 and west of highway 95. Elevation ranges from a low of 4,265 feet to a high of 8,858 feet. The Paymaster HMA is near the Montezuma Peak HMA. Wild horses are known to move between these two HMA's on a regular basis.

Table 9 displays the proposed lease sale parcels, as well as, the deferred parcels. Within the Paymaster HMA, 22 parcels wholly exist as shown in the following table:

Table 9. Paymaster HMA Proposed Parcels

Parcel Number	Total Acres	Acres within HMA	Deferred
NV-15-06-050	2010	1061	Partial-670 acres remain within HMA
NV-15-06-051	2002	2002	Yes
NV-15-06-052	2558	2558	Yes
NV-15-06-053	2566	2566	Partial-2400 acres remain within HMA
NV-15-06-054	1941	1703	Yes
NV-15-06-055	1290	1290	Yes
NV-15-06-056	2566	2566	Yes

Parcel Number	Total Acres	Acres within HMA	Deferred
NV-15-06-057	2569	2569	Partial-2511 acres remain within HMA
NV-15-06-058	1929	1929	Yes
NV-15-06-059	1927	1927	Yes
NV-15-06-060	1930	1930	Partial-663 acres remain within HMA
NV-15-06-066	1902	1165	Yes
NV-15-06-067	1953	262	Partial- 261 acres remain within HMA
NV-15-06-079	2603	399	Yes
NV-15-06-080	1845	1845	Yes
NV-15-06-081	1911	1911	Yes
NV-15-06-082	2619	493	Yes
NV-15-06-083	2584	552	Yes
NV-15-06-084	2588	2588	Yes
NV-15-06-085	2579	566	Yes
NV-15-06-086	2593	451	Yes
NV-15-06-087	2607	1532	Yes
Total Acres	49,072	33,865	27,024

Saulsbury HMA

The Saulsbury HMA is approximately 20 miles east of Tonopah NV in Nye County and is divided into two sections, north and south, by USFS land, and US Highway 6. The north section is located in the northeast portion of Ralston Valley and covers 73,795 acres. It is bordered on the west by State highways 376 and 82. The east side borders USFS land and the Monitor Wild Horse Territory. The southern section consists of 62,182 acres between US Highway 6 and the Nellis Air Force Base. It is bordered on the east by the Stone Cabin HMA and the Monitor Wild Horse Territory on the north. Elevations range from 5,620 to 8,172 feet.

Wild horses are move back and forth between the Monitor WHT and the northern section of the Saulsbury HMA on a regular basis. The US Highway 6 right-of-way was recently fenced and now prevents movement between the Monitor WHT and the southern portion of the HMA.

Table 10 displays the proposed lease sale parcels, as well as, the deferred parcels. Within the Saulsbury HMA, 23 parcels exist as shown in the following table:

Table 10. Saulsbury HMA Proposed Parcels

Parcel Number	Total Acres	Acres with HMA	Deferred
NV-15-06-163	2529	2505	No
NV-15-06-164	1892	1871	No
NV-15-06-165	1895	1878	No
NV-15-06-166	1904	1893	No
NV-15-06-167	1902	1900	No
NV-15-06-168	1742	186	No
NV-15-06-169	1750	1008	No
NV-15-06-170	2432	2017	No
NV-15-06-171	2453	2327	No

Parcel Number	Total Acres	Acres with HMA	Deferred
NV-15-06-172	2455	2399	No
NV-15-06-173	1919	1919	No
NV-15-06-174	1934	1934	No
NV-15-06-175	1945	1945	No
NV-15-06-176	1955	1955	No
NV-15-06-177	1943	1943	No
NV-15-06-178	1924	1924	No
NV-15-06-179	1962	1962	No
NV-15-06-180	2576	2576	No
NV-15-06-182	1981	1981	No
NV-15-06-181*	2574	2538	No
NV-15-06-183*	2584	2360	No
NV-15-06-186*	2558	1209	No
NV-15-06-188*	2575	1131	No
Total Acres	49,384	43,361	0

*portions of these parcels are located within Stone Cabin HMA.

Though there are no springs within any of these parcels available for use by horses, there are range improvements (water developments) in parcels 177, 168, 170 and a critical water source just west of parcel 186. The range improvements are used by horses when they are turned on for cattle use. During the summer months the critical water source is the only source of water for horses south of US Highway 6.

Stone Cabin HMA

The Saulsbury HMA is approximately 30 miles east of Tonopah, NV in Nye County and is divided into two sections, north and south, by US Highway 6. The north section is located in the Stone Cabin Valley, extending north of US Highway 6 to the Little Fish Lake WHT on USFS lands. The western side borders the Monitor WHT and the eastern side borders the Hot Creek HMA. The south portion extends south of US Highway 6 through Stone Cabin Valley to the Nellis Air Force Base, and is bordered on the east by the Reveille HMA and Kawich Range and on the west by the southern portion of the Saulsbury HMA. Elevations range from 5357 to 9000 feet.

Wild horses are known to move back and forth between the Monitor WHT and the northern portion of the Stone Cabin HMA. Movement can also occur between the southern portion of the HMA and Saulsbury and Reveille HMAs and the Nevada Wild Horse Range on the Nellis Air Force Base.

Table 11 displays the proposed lease sale parcels, as well as, the deferred parcels. Within the Stone Cabin HMA, 12 parcels exist as shown in the following table:

Table 11. Stone Cabin HMA Proposed Parcels

Parcel Number	Total Acres	Acres with HMA	Deferred
NV-15-06-181*	2574	36	No
NV-15-06-183*	2584	225	No
NV-15-06-186*	2558	1300	No
NV-15-06-188*	2575	1444	No
NV-15-06-184	2532	2442	No

NV-15-06-185	2537	2537	No
NV-15-06-187	2538	2538	No
NV-15-06-189	1735	1735	No
NV-15-06-190	1598	1579	No
NV-15-06-191	2243	2203	No
NV-15-06-192	2241	2199	No
NV-15-06-193	2549	2504	No
Total Acres	28,264	20,742	0

*portions of these parcels are located within Saulsbury HMA.

Though there are no springs within any of these parcels available for use by horses, there is a range improvement (water development) in parcel 190. The range improvement may be used by horses when it is turned on for cattle use.

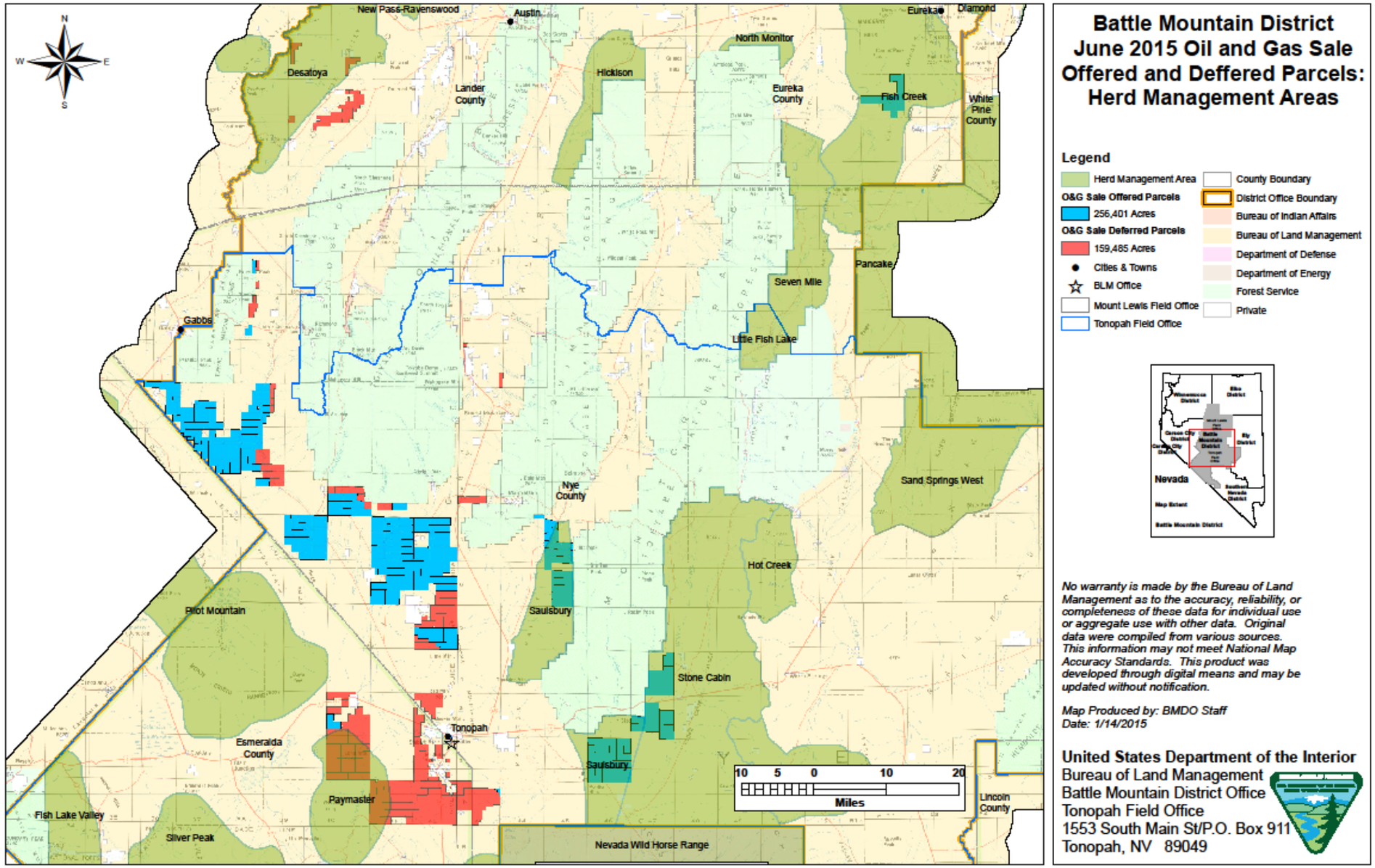

Figure 5 - Herd Management Areas in the June 2015 Lease Sale Area

Environmental Consequences

Direct impacts to wild horses or burros would not occur due to oil and gas leasing. Indirect and cumulative impacts would result from exploration activities, well drilling and development/production. Should exploration or development be proposed within these leased areas, additional, site specific NEPA analysis would be completed to assess the potential impacts to wild horses and their habitat in these areas.

The primary indirect impacts would include the influence to herd distribution and movement patterns throughout the HMAs and disturbance to the forage resource.

Mining exploration activities are common throughout the BMD and oil and gas exploration activities would produce similar impacts to wild horses and burros. Direct impacts to wild horses could include disturbance due to increase human activity. These impacts would likely be short term in nature and would consist of wild horses moving out of the area or changing movement patterns. The degree of disturbance to wild horses would be equivalent to the levels of exploration/development and increased activity in the area. Disturbance would cease with the completion of exploration efforts.

Localized and small scale vegetation disturbance could occur due to seismic testing, road construction, overland travel and drill pad construction, which would have an overall minimal impact to the forage available within the HMA. Per the RFD Scenario described in Section 2.4, it is highly unlikely that large amounts of disturbance would occur within the parcels offered for lease within wild horse HMAs. However, if parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

The impacts to wild horse distribution, movement patterns and long term genetic health from future production/development would also be congruent upon the size and location of such operations, in relation to water sources and wild horse movement passageways.

Wild horses that commonly utilize a particular area that is subsequently developed for oil or gas production would be pressured to move from that portion of the HMA and no longer use it. Increased vehicle traffic, road construction and human presence could cause the wild horses to use the developed area less and use other areas within the HMA more. This could result in impacts to the other areas within the HMA if increased use causes damage to the vegetation through increased utilization of forage resources and water sources.

The BLM is mandated to manage wild horses and burros only within those areas where they were found at the time the WFRHBA was passed in 1971. Wild horses and burros cannot be relocated somewhere else within the District and new HMAs cannot be created for them. Nor is BLM allowed to expand the HMAs beyond d the 1971 Herd Area boundaries to replace habitat lost.

3.4.17 Forestry and Woodland Products

Affected Environment

The lease area contains mountains, alluvial fans, foothills and riparian zones which support unique varieties of woodland and forest tree species. These include quaking aspen, curlleaf

mountain mahogany, single-leaf pinyon pine, Utah juniper, narrow-leaf cottonwood, black cottonwood, Fremont cottonwood and willow (*Salix* spp.).

Quaking Aspen

Populus tremuloides, commonly known as Quaking aspen is a rather short-lived (i.e., 100 to 150 years) deciduous, hardwood belonging to the *Salicaceae* (willow) family. It is typically found in monotypic stands with mature trees reaching heights of Greater than 60 feet. Nationally, it has the widest distribution of any native tree species. Due to its unique biological characteristics and rarity, the harvesting of both live and dead aspen is prohibited throughout all parcels. Quaking aspen communities are represented in approximately 1,331 acres in the Battle Mountain District (Brieland and Tueller 2003). However, these vegetative communities are important since they comprise the highest ecological biodiversity of plants and animals found in the Assessment Area. They are also major indicators of upper watershed health since they naturally grow and thrive only in, or adjacent to riparian zones that contain adequate surface water and quality (streams and springs) or high water tables.

Curlleaf Mountain Mahogany

Cercocarpus ledifolius, commonly known as the Curlleaf mountain mahogany is not extensive in the Assessment Area. However, some of the largest communities exist in the Antelope Range. Curlleaf mountain mahogany is a long-lived (i.e., Greater than 500 years) evergreen hardwood associated with other higher-elevation tree species such as limber pine. It can exist in pure stands and reach heights of Greater than 25 feet. It grows best in a zone between 7,000 and 10,000 feet and is an important browse species for mule deer, especially in the winter months. Due to the relative scarcity of mahogany throughout the district, only a limited number of deadwood only harvesting permits are allowed each year.

Pinyon Pine and Juniper

Pinus monophylla or singleleaf Pinyon pine is a relatively long-lived evergreen softwood (500 to 800 years), belonging to the *Pinaceae* family. The conifer grows best at elevations between 4,500 and 9,000 feet, on higher alluvial fans, foothills and mountain slopes. It is a comparatively short tree, reaching maximum heights of 40 feet.

Prehistorically, the pine nuts of the pinyon were used as a major source of food by ancient native cultures such as the Anasazi. Today, the nuts are harvested by the general public and are spiritually revered by Native Americans such as the Paiute and Shoshone. Commercial harvests of pinyon nuts have been conducted on the Assessment Area when production levels have been adequate. Production is cyclical, depending on a number of complex factors such as moisture and temperature. Pine nuts are also a very important food source for smaller mammals, rodents and birds such as the scrub jay and Clark's nutcracker.

Some other current uses of pinyon are for fuel wood and Christmas trees. The BMD sells hundreds of permits every year, including commercial harvest contracts.

Juniperus osteosperma or Utah Juniper is a long-lived (Greater than 2,000 years) evergreen softwood belonging to the *Cupressaceae* family. The tree can be found in pure stands or mixed with pinyon pine at elevations ranging from as low as 4,000 feet up to approximately 8,000 feet. Like its associate, the pinyon, the juniper tree is rather short reaching heights of

approximately 30 feet. The tree is well distributed throughout the Great Basin and the assessment area on alluvial fans, foothills and mountain slopes. During the settlement of the west, juniper was used extensively for building structures, fence posts, fuel wood for cooking and heating and the production of charcoal for mining operations. In the assessment area, the wood is utilized only for fuel wood and fence posts. As with pinyon pine, there are currently no accurate inventories of actual juniper acreages in the assessment area.

Field observations over the last few years have revealed widespread mortality in pinyon/juniper stands. The majority of this mortality is associated with increases in bark beetle activity and is exacerbated by drought and resource competition.

Cottonwood

Cottonwoods (*Populus spp.)* are deciduous hardwood poplars belonging to the willow family. They are found naturally in riparian areas along stream banks, on the periphery of springs and ponds and planted in agricultural areas within the lease area. These native cottonwoods rapidly grow to heights of Greater than 80 feet, with girths up to five feet and are relatively short-lived (i.e., 150 years). Unlike their aspen cousins, they can regenerate both from sprouting and seed. These species can also be propagated by transplanting suckers or small limbs. Currently, the BMD protects the trees from any type of harvesting, including deadwood.

Willow

Willows (*Salix spp.)* are hardwood members of the *Salicaceae* family with deciduous foliage and affinities for riparian habitats with high water tables. Ranging in height from ten to 40 feet, there are more individual species of willow than any other hardwood found in the assessment area. Like their poplar relatives, they require relatively large, consistent amounts of water to thrive and regenerate. They are not legally harvested in the BMD. In the assessment area, willows can be found in monotypic communities or associated with other riparian vegetation such as sedge, rush and poplars.

Environmental Consequences

Impacts associated with exploration, development and production could have impacts on forest resources including shrubs, trees and riparian vegetation (e.g., aspen, cottonwoods, willows). Oil and gas exploration would utilize off-road vehicles and equipment for exploration. This equipment could include four-wheel drive trucks as well as larger and heavier wheeled vehicles. Damage to forest and woodland species such as pinyon pine, juniper and riparian types such as quaking aspen, cottonwood and willow could result from the contact of such equipment with individual plants.

Based on the history of oil and gas exploration in the BMD, it is likely that the majority of exploration and development efforts would be focused on the lower elevation alluvial fans and playas. If parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

4.0 CUMULATIVE IMPACTS ANALYSIS

The Proposed Action has been examined for cumulative effects to the project area and the surroundings. Cumulative impacts are those effects on resources within an area or region caused by

a combination of past, present and reasonable foreseeable future actions (RFFA's). These impacts may be individually minor but added together over time may become significant (40 CFR 1508.7).

The cumulative effect study area (CESA) for this environmental assessment encompasses the entire BMD (Figure 6). Oil and gas leases are leased for a 10-year time period; therefore, the same timeframe was selected for the cumulative effect study analysis.

The term "mitigation" used in the following sections refers to resource protection measures that could be used when actual leases are developed subsequent to this lease sale.

4.1 Past and Present Actions

Most of the oil and gas exploration and development conducted in the BMD has occurred in the TFO area. Nye County was the location of the first producing oil well in Nevada. Shell's Eagle Springs # 1-35 well was discovered in 1954. The Eagle Springs discovery well attracted major oil companies to explore several of eastern Nevada's valleys which produced encouraging shows, but no discoveries. The Trap Springs field was discovered in 1976 by Northwest Exploration. The most prolific oil field in Nevada was discovered in 1983, when Northwest Exploration Grant Canyon No. 1 was drilled and completed. Grant Canyon No. 1 was the most prolific onshore oil well in the continental United States, flowing up to 4,300 barrels of oil per day. The most recent oil field discovered was Sans Spring, in 1993.

Land-use authorization; like new road, powerline and pipeline ROW's and renewal of existing ROW's associated with oil and gas production and grazing can be expected in the future.

Historical Oil & Gas lease sales have included hundreds of parcels in the CESA where expressions of interest were submitted by prospective lessees. Between 20 and 50 percent of the parcels have typically been sold during and the day after the lease sales. There are currently 32 oil producing leases within the BMD. Since 2001, there have been 14 oil and gas well permits issued in the CESA. BMDO typically authorizes fewer than 4 APD's per year and 1-2 geophysical exploration permits every decade, most of which are in Nye County.

The oil and gas program consist mainly of speculative leasing and the drilling of wildcat wells in and around existing oil fields in the Railroad Valley. Three wildcat wells have been drilled since 2009. All have been plugged and abandoned.

Livestock grazing has been authorized in the past and is currently authorized. In the CESA there are approximately 10.5 million acres of land under 94 grazing allotments.

4.2 Reasonably Foreseeable Future Actions (RFFA's)

The Proposed Action does not include exploration, development, production, or final reclamation of oil and gas resources; however, authorization of oil and gas leasing does convey a right to subsequent exploration and production activities. These later activities are associated with oil and gas leasing; therefore, they are analyzed as part of the Proposed Action.

As noted in the Draft Tonopah Resource Management Plan and Environmental Impact Statement (June, 1993), the extremely complex geologic structure of the area has limited the success rate of wells. The 2006 and 2008 *Environmental Assessments for Oil and Gas Leasing Within Portions of*

the Shoshone-Eureka Assessment area outlined minimal Oil and Gas activity within the respective assessment area.

The RMP projections for oil and gas exploration and development in the assessment area (see p. 12 of this EA) appear to have been somewhat overestimated; however, modest amounts of oil and gas exploration are expected to continue in the BMD over the next ten years even with the current technological advances in HF. Geophysical surveys may be conducted prior to any exploratory drilling. Surface disturbance associated with geophysical surveys are usually minimal. An APD may then be submitted for a wildcat well in the CESA, or a production well within an existing field. A site specific NEPA document would be prepared prior to approval of any application to conduct surface disturbing activities.

Within the BMD, the most recently discovered oil field, Sans Spring, was discovered in 1993. There have been no new discoveries within the BMD in over 20 years. Based on oil and gas exploration/production well history within the BMD it is unlikely that another oil field would be expected to be developed within the next ten years. As previously outlined in the RFD, it is anticipated that surface disturbance associated with oil and gas exploration, production, and development within the BMD would be approximately 50-100 acres.

Other RFFAs would include activities such as, geothermal exploration, geothermal development, wind power construction, livestock grazing, off-highway vehicle use, mineral exploration, mining, recreation (hunting, mountain biking, geo-caching), withdrawal of water for irrigation (agriculture) and mining, gravel pit development and production, communication site construction, road building, powerline construction, wild horse gathers, noxious weed treatment, fire suppression and rehabilitation, construction of wildlife habitat improvement projects, realty actions, and fence construction.

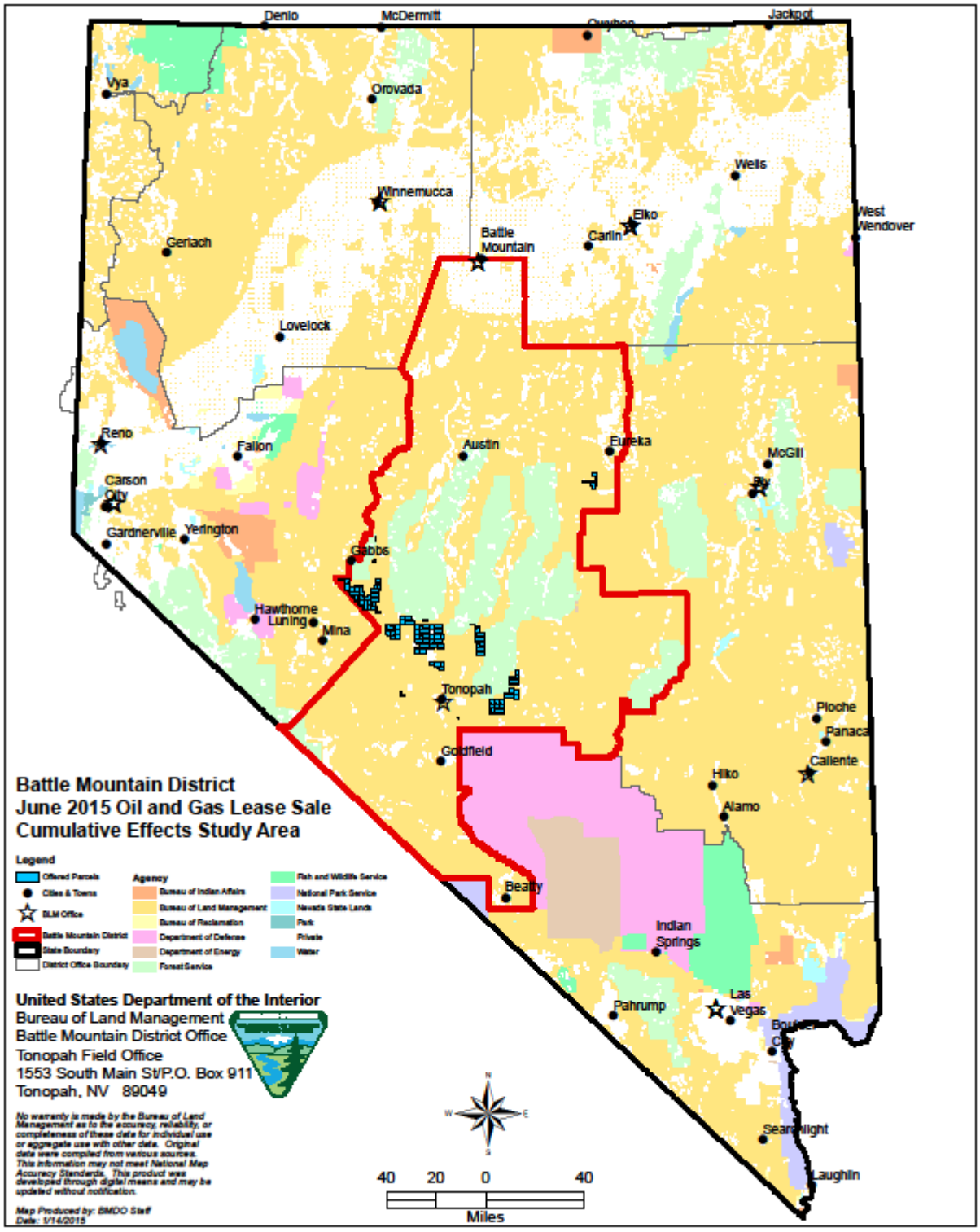

Figure 6 - Cumulative Effects Study Area

4.3 Cumulative Impacts Evaluation

4.3.1 Cumulative Impacts on Air Quality

Past, continued, proposed and foreseeable road, power line and pipeline construction, minerals exploration and recreation all create air quality impacts. Increased volumes of carbon dioxide, carbon monoxide and particulates have been and would be caused by vehicle exhaust, disturbing the soil cover from additional travel on existing dirt roads and the construction of new access roads and well pads and additional drilling.

Geophysical exploration has in the past and would in the foreseeable future cause very little impact to air quality because the exploration equipment would be in the area for a very short time (typically less than a week) and little or no additional surface disturbance would be created to disturb the soil.

Activities associated with drilling wells typically last less than a month and the potential to increase particulate matter from multiple trips is mitigated by placing gravel on the access roads and protecting the soil. As outlined in the environmental consequences section, these localized, temporary impacts are not expected to significantly affect air quality in the area or exceed air quality standards.

Mitigation

The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. In accordance with a recent BLM Memorandum of Understanding (MOU) regarding air quality analysis and mitigation; BLM would coordinate with the Environmental Protection Agency (EPA) early in the APD process to determine how best to model and mitigate for impacts to air quality. Measures may also be required as COAs on permits by either the BLM or the applicable state air quality regulatory agency. The BLM also manages venting and flaring of gas from federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

- Some of the following measures could be imposed at the development stage:
- Flaring or incinerating hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- Emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;
- Emission control equipment of a minimum 95 percent efficiency on dehydration units, pneumatic pumps, produced water tanks;
- Vapor recovery systems where petroleum liquids are stored;
- Tier II or Greater, natural gas or electric drill rig engines;
- Secondary controls on drill rig engines;
- No-bleed pneumatic controllers (most effective and cost effective technologies available for reducing VOCs);
- Gas or electric turbines rather than internal combustions engines for compressors;

- NO_x emission controls for all new and replaced internal combustion oil and gas field engines;
- Water dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;
- Interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.
- Co-located wells and production facilities to reduce new surface disturbance;
- Directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- Gas-fired or electrified pump jack engines;
- Velocity tubing strings;
- Cleaner technologies on completion activities (i.e. green completions), and other ancillary sources;
- Centralized tank batteries and multi-phase gathering systems to reduce truck traffic;
- Forward looking infrared (FLIR) technology to detect fugitive emissions; and
- Air monitoring for NO_x and ozone.

4.3.2 Cumulative Impacts on Cultural and Paleontological Resources

Cumulative Impacts on Cultural Resources
The geographic area considered for cultural resources encompasses the whole of all parcels identified. A number of ongoing and potential actions in the area, such as mining, mineral and geothermal exploration, off-highway vehicle use, and livestock grazing, have the potential to cumulatively impact cultural resources. The June 2015 Oil & Gas Lease Sale does not authorize any ground disturbance and therefore has no direct effect to cultural resources; however, the reasonably foreseeable role of oil and gas exploration and development may contribute to cumulative impacts to cultural resources. Through the implementation of appropriate mitigation, BMPs, and the COAs, adverse effects to historic properties may be avoided.

Cumulative Impacts on Paleontological Resources
The geographic area considered for paleontological resources encompasses the parcels identified. A number of ongoing and potential actions in the area, such as mining, mineral and geothermal exploration, off-highway vehicle use, and livestock grazing, have the potential to cumulatively impact paleontological resources. It is expected that the proposed action may contribute to cumulative impacts, through the reasonably foreseeable role of oil and gas exploration and development; however, with implementation of appropriate mitigation, BMPs, and the COAs, adverse effects to significant paleontological resources may be avoided.

Mitigation
Avoidance through project redesign is the preferred method of eliminating adverse effects to historic properties and paleontological resources; however, when avoidance is not feasible, measures may be implemented to mitigate impacts. Examples of mitigation, BMPs, and the COAs for cultural resources may include additional studies, data recovery, and stabilization of historic structures.

4.3.3 Cumulative Impacts on Native American Cultural Concerns

Fluid mineral leasing and exploration may contribute to the general decline in sites and associated activities of a cultural, traditional and spiritual nature. Presently, impacts to many cultural, traditional, spiritual sites and associated activities have been avoided through Native American consultation efforts. Only the potential impacts to tribal resources were analyzed in this EA because it evaluates the leasing of oil and gas proposed parcels and does not analyze areas of proposed surface disturbance where impacts might be expected. In accordance with the National Historic Preservation Act (P.L. 89-665), the National Environmental Policy Act (P.L. 91-190), the Federal Land Policy and Management Act (P. L.94-579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (P.L. 101-601) and Executive Order 13007, the BLM must also provide affected tribes an opportunity to comment and consult on proposed actions. BLM must attempt to limit, reduce, or possibly eliminate any negative impacts to Native American traditional/cultural/spiritual sites, activities, and resources. As stated above, if, as a result of leasing, a ground disturbing plan to explore or develop is submitted to BLM, all applicable laws, regulations, directives, SOPs, and stipulations and limitations would apply.

BLM reserves the right to alter proposed activities associated with any surface occupancy that results from Oil, and Gas, leasing. Consequently, the BLM must take steps to identify locations having traditional/cultural or religious values to Native Americans and insure that its actions do not unduly or unnecessarily burden the pursuit of traditional religion or traditional values.

4.3.4 Cumulative Impacts on Wildlife Resources

Disturbance and fragmentation of wildlife habitat, including oil and gas development, may impact wildlife species by displacement or temporarily and permanently altering habitat. In turn, habitat loss and displacement can have negative impacts on wildlife populations. For example, reduced habitat availability can increase competition particularly if preferred habitats are limited or near carrying capacity. In these cases, an overall reduction in population size is expected, which is of particular concern for small or isolated populations.

A number of other ongoing projects and future activities in the offered parcels, such as locatable mineral exploration, off-highway vehicle use and livestock grazing could cumulatively impact wildlife. These activities could result in loss of habitat, habitat fragmentation and disruption of movement patterns. It is expected that the proposed action may contribute to cumulative impacts if exploration and development of the lease parcels is authorized in the future. However, as outlined in the RFD, the reasonably foreseeable role of oil and gas exploration and development in overall impacts within the offered parcels is low (50-100 acres of overall surface disturbance over after a ten year period). Combined with the low disturbance potential and with the implementation of site-specific COAs, BMPs and mitigation measures potential impacts of oil and gas exploration and development are anticipated to be negligible. Please see Appendix B for a list of wildlife timing limitation stipulation that would be applied to the offered parcels. In addition, several parcels were proposed for deferral that contain important habitat for SSS fish, Greater sage-grouse, mule deer, bighorn sheep, pronghorn antelope and riparian dependent species (Appendix C).

4.3.5 Cumulative Impacts on Water Quality (Surface and Ground) and Quantity

The Proposed Action would not result in any direct incremental increase in cumulative impacts to water resources, but subsequent oil & gas development would likely increase impacts as described above in the Proposed Action section. Specifically, potential exploration and development would likely result in additional water diversion, and surface water quality could be affected by development. The incremental increase in these impacts is small when compared to the level of impacts that already exist in the sub-basins as described above in the Affected Environment section. With the relatively small amount of surface disturbance associated with the RFD and through the implementation of site-specific mitigation measures, COAs, and BMPs, the incremental cumulative impacts on water quality and quantity, in combination with past and present actions and RFFAs, would not be significant.

Mitigation

Protection of water resources would be accomplished through implementation of best management practices along with specific restrictions that may be applied to individual parcels. Some parcels with sensitive water resources have been identified and proposed for deferral (see Appendix C). Additional stipulations may be applied to mitigate any known environmental or resource conflicts that may occur on a given lease parcel For example, lessees may be required to locate facilities a distance of 400 feet from streams or off of the 100 year floodplain. These restrictions would be implemented on an individual parcel basis and would be required as a condition of approval for exploration and development.

4.3.6 Cumulative Impacts on Wastes, Hazardous and Solid

Other major hazardous and solid waste generating activities include mineral exploration, mining, and geothermal exploration. When these activities are combined with the small acreage of oil and gas activity disturbance identified in the RFD, as well as any mitigation developed during sitespecific analysis for oil and gas exploration and development, the cumulative impacts would be negligible. Additionally, federal and state government specifically regulate each project to ensure that there are no releases of hazardous materials into the environment.

4.3.7 Cumulative Impacts on Noxious Weeds and Invasive, Non-native Species

A number of ongoing and potential actions in the area, such as mining, mineral and geothermal exploration, off-highway vehicle use, and cattle grazing may have contributed to the infestation and spread of noxious weeds, invasive and non-native species within the CESA. The proposed action and possible subsequent exploration and development of oil and gas leases may increase the potential for impacts to existing native plant communities. However, measures taken in accordance with the prevention schedule and BMPs included in the plans of operations for future oil and gas projects would reduce the establishment and spread of noxious weeds, invasive and non-native species. With the relatively small amount of surface disturbance associated with the RFD and by implementing site specific mitigation measures to potential oil and gas activities, the incremental effect from past, present and future activities combined with the proposed action is anticipated to have minimal cumulative impacts to noxious weeds, invasive and non-native species.

4.3.8 Cumulative Impacts on Geology and Minerals

A number of other ongoing activities such as mining, mineral exploration, geothermal

exploration and production, sand and gravel pit development, could cumulatively impact mineral resources within the BMD. These impacts include conflicts between exploration and development of minerals resources and loss of access to mineral resources. However, based on the small scale of expected disturbance from oil and gas-related activities outlined in the RFD the cumulative impact to minerals and geology is expected to be negligible. Impacts that may exist could be mitigated by negotiations between operators. Six parcels that overlap existing mine boundaries have been proposed for deferral to avoid conflicts.

4.3.9 Cumulative Impacts on Soils

The disturbance associated with oil and gas exploration and production would add to the disturbances from mining exploration, mine development, grazing management, wild fires, fire rehabilitation and range improvement projects. The creation of new roads, construction of drill pads and the development of wells and mines removes available vegetation and increases the susceptibility of soil erosion and soil compaction and disturbs microbiotic crusts. However, the cumulative impacts of oil and gas exploration and development on soils are expected to be minimal due to the relatively small area of disturbance, concurrent reclamation, and the development of site-specific mitigation and BMPs.

4.3.10 Cumulative Impacts on Vegetation

The disturbance associated with potential oil and gas exploration and production would add to the disturbances from mining exploration, mine development, grazing management, wild fires, fire rehabilitation and range improvement projects. The creation of new roads, construction of drill pads and the development of wells and mines removes vegetation utilized by wildlife, livestock, wild horses and burros for forage and habitat. Disturbed areas would be more susceptible to wind and water erosion, soil compaction and invasion by invasive species. However, the cumulative impacts of oil and gas exploration and development are expected to be minimal due to the relatively small area of disturbance, concurrent reclamation, and the development of site-specific mitigation and BMPs.

4.3.11 Cumulative Impacts on Range Resources

The disturbance associated with oil and gas exploration and production would add to the disturbances from mining exploration, mining and off-highway vehicle use. The creation of new roads, construction of drill pads and the development of wells and mines removes available forage for wildlife, livestock, wild horses and burros. Reductions of available forage could have an impact on ranching operations. However, based on the RFD, the cumulative impacts of the proposed action on range resources are expected to be minimal due to the relatively small area of disturbance, concurrent reclamation and developed site-specific mitigation.

4.3.12 Cumulative Impacts on Land and Realty

There is little appreciable potential for the Proposed Action to have substantial cumulative impacts from past, present and RFFAs to realty actions within the assessment area. Based on the RFD, only a small percentage of acres of constructed roads associated with exploration/development would potentially remain after ten years. This small acreage, when combined with site-specific mitigation measures for exploration and development, indicates that the potential cumulative impacts from the Proposed Action are negligible and would not be significant.

4.3.13 Cumulative Impacts on Visual Resources

The cumulative impacts from past, present and future activities as previously outlined, remain low to moderate for visual resources due to the likelihood of large distances between actions and limited surface disturbance. Most of the future activities would be on valley floors. Visual resources are mitigated on a case-by-case basis and many of the activities would be temporary in nature.

Principal existing human-made visual features within the assessment area include several county roads and US highway 6. There are also several gravel and native surface secondary roads, ranches, farms and electrical transmission lines. None of the future activities would create any visual impact inconsistent with the applicable VRM Class ratings for the assessment area. With the relatively small amount of surface disturbance associated with the RFD and through the implementation of site-specific mitigation measures, COAs, and BMPs, the incremental cumulative impacts on visual resources, in combination with past and present actions and RFFAs, would not be significant.

4.3.14 Cumulative Impacts on Recreation

Increased commercial developments would increase the population of the area, which would in turn create an increase in all recreational activities such as visits to WSAs, hunting and off-highway vehicle use in the assessment area. Given that many recreational activities are dependent upon a high quality visual/aesthetic environment, commercial developments, including fluid mineral development, has the potential to lower the quality of recreational experiences in the assessment area. However, given the RFD scenario for fluid minerals along with other existing and foreseeable developments and any mitigation measures developed during site specific analysis in the assessment area, it is not anticipated that the quality of recreational experiences would be significantly reduced.

4.3.15 Cumulative Impacts on Socioeconomics

Specific information regarding the timing, duration, and level of employment is not available for other RFFAs that may occur within the CESA, precluding a comprehensive analysis of potential cumulative socioeconomic impacts. As stated earlier, site-specific analysis for exploration and development would be required prior to implementation and a more thorough examination of socioeconomics would be done at that time. The Proposed Action does not: Induce substantial growth or concentration of population, displace a large number of people, cause a substantial reduction in employment, reduce wage and salary earnings, cause a substantial net increase in county expenditures, or create a substantial demand for public services. In the volatile economy of the foreseeable future, it is expected that the cumulative and incremental socioeconomic effects of the proposed action, would be beneficial and not significant.

4.3.16 Cumulative Impacts on Wild Horses and Burros

Cumulative impacts to wild horses from oil and gas leasing would consist of the impacts occurring as a result of exploration and production which could occur in lease areas associated with the RFD. The CESA for wild horse and burro management would include the HMAs in which the leases are located as well as those HMAs adjoining the affected HMAs.

Past, present and reasonably foreseeable projects that have and could continue to have impacts to wild horses include mining exploration, geothermal exploration, oil and gas exploration, power line construction, wild land urban interface activities, wild horse gathers, communication site construction and noxious weed treatment. These activities have the result of isolated and usually limited soil and vegetation disturbance or loss.

Two primary impacts to wild horses were considered that could occur from oil and gas exploration and development – increased fragmentation of wild horse habitat and cumulative increases in vegetation and soil disturbances, which result in incremental losses in availability of quality habitat used for wild horses.

Oil and gas exploration could involve overland travel, road construction, seismic testing and drilling which could cause surface disturbance. Over time, the areas of disturbance would cumulatively increase and impact the quality and quantity of habitat available to wild horses, as well as increase risks for erosion and noxious weed invasion.

Mining activity, oil and gas production, geothermal development, gravel pit expansion, road building, fencing and wild horse gathers, are all activities, which can impact wild horse distribution and seasonal movement throughout and between HMAs. Each activity could result in incremental restrictions to free roaming behavior of wild horses and over time may influence utilization patterns, genetic interchange and use of water sources.

According to the Trends and Projections Scenario described in Section 2.4.1, it is unlikely that large areas of disturbance would occur within the parcels offered for lease within wild horse HMAs and therefore the effects are anticipated to be minimal.

Exploration and production activities would be analyzed on a site specific basis. Effects of potential proposed actions to wild horse populations in the HMAs would be analyzed and mitigation measures developed to avoid or reduce impacts, or COAs would be implemented to protect the long term health of wild horses.

4.3.17 Cumulative Impacts on Forestry and Woodland Products

A number of past, present and RFFAs in the area such as mining, mineral and geothermal exploration, off-highway vehicles use and livestock grazing could contribute to cumulative impacts. Based on the RFD, foreseeable impacts could result in the construction of a number of drilling sites, production facilities and transportation corridors. The long-term change in vegetation and associated potential loss of woodland productivity (pinyon-juniper) would not result in substantial impacts since the assessment area contains abundant pinyon-juniper woodlands. In addition, it is likely that the majority of exploration and development efforts would be focused on the lower elevation alluvial fans and playas. Based on the RFD and when considering site-specific mitigation measures that would be developed for potential exploration and development, cumulative impacts to forest and woodland resources are not expected to be significant.

Mitigation

Measures to reduce potential impacts as a result of leasing activities on forest resources could include avoiding the removal of trees, except when necessary by rerouting or relocating road routes and facilities, or by limbing trees. Trees requiring removal should be disposed of by the operator. Where blading is required, stumps would be removed or buried in an area designated by the Authorized Officer. Where blading is not required, stump height should not exceed 12 inches. All slash less than four inches in diameter should be chipped, scattered outside the cleared area, or stockpiled for use during reclamation as directed by the Authorized Officer. All material four inches in diameter and Greater would be removed from federal land unless otherwise directed. A wood permit from BLM for the wood removed (for the appraised value) could be required prior to any clearing. Best management practices along with specific restrictions would be implemented to minimize negative impacts to forest resources. Site specific mitigation would be developed to minimize or avoid potential impacts to quaking aspen, cottonwood, willow, mountain mahogany, and limber pine trees.

5.0 CONSULTATION AND COORDINATION

5.1 List of Preparers

Chris Worthington, Mount Lewis Field Office, Senior Planning and Environmental Coordinator
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William ONeill, Mount Lewis Field Office, Wildlife Biologist
Christine McCollum, Tonopah Field Office, Archaeologist
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Leesa Marine, Mount Lewis Field Office, Land Law Examiner,
William Coyle, Tonopah Field Office , Assistant Field Manager, Non-Renewable
Ben Cramer, Mount Lewis Field Office, Outdoor Recreation Planner
Shawna Richardson, Mount Lewis Field Office, Wild Horse and Burro Specialist
Austin Brewer, Tonopah Field Office, Wild Horse and Burro Specialist
Chad Lewis, Mount Lewis Field Office, Fuels Program Manager/District Forester

5.2 Agencies/Tribes Contacted

South Fork Band of the Western Shoshone
Duckwater Shoshone Tribe
Yomba Shoshone Tribe
Timbisha Shoshone Tribe
Fallon Paiute-Shoshone Tribe
Walker River Paiute Tribe
Nevada Department of Wildlife (NDOW)

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APPENDIX A

LIST OF PARCELS OFFERED FOR SALE IN THE JUNE 2015 OIL AND GAS LEASE SALE

NV-15-06-001 2480 Acres
T.0100N, R.0360E, 21 MDM, NV
Sec. 001 PROT ALL;
002 PROT ALL;
011 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-002 1582 Acres
T.0100N, R.0360E, 21 MDM, NV
Sec. 003 LOTS 1-16;
004 LOTS 1-12;
005 LOTS 1-12;
Nye County
Battle Mountain DO

NV-15-06-003 1279 Acres
T.0100N, R.0360E, 21 MDM, NV
Sec. 012 PROT
025 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-004 2558 Acres
T.0100N, R.0360E, 21 MDM, NV
Sec. 013 PROT ALL;
014 PROT ALL;
023 PROT ALL;
024 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-005 2231 Acres
T.0090N, R.0370E, 21 MDM, NV
Sec. 002 PROT ALL;
008 PROT N2;
011 PROT ALL;
012 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-006 2376 Acres
T.0090N, R.0370E, 21 MDM, NV
Sec. 004 PROT ALL;
005 PROT ALL;
006 PROT E2,NW;
009 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-007 2552 Acres
T.0090N, R.0370E, 21 MDM, NV
Sec. 010 PROT ALL;
015 PROT ALL;
016 PROT ALL;
022 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-008 2552 Acres
T.0090N, R.0370E, 21 MDM, NV
Sec. 013 PROT ALL;
014 PROT ALL;
023 PROT ALL;

024 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-009 1913 Acres

NV-15-06-010 1830 Acres
T.0100N, R.0370E, 21 MDM, NV
Sec. 014 PROT S2N2N2,S2N2,S2;
015 PROT ALL;
016 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-011 2502 Acres
T.0100N, R.0370E, 21 MDM, NV
Sec. 019 PROT ALL;
020 PROT ALL;
029 PROT ALL;
030 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-012 2550 Acres
T.0100N, R.0370E, 21 MDM, NV
Sec. 021 PROT ALL;
022 PROT ALL;
027 PROT ALL;
028 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-013 2552 Acres
T.0100N, R.0370E, 21 MDM, NV
Sec. 023 PROT ALL;
026 PROT ALL;
035 PROT ALL;

T.0090N, R.0370E, 21 MDM, NV
Sec. 025 PROT ALL;
026 PROT ALL;
036 PROT ALL;
Nye County
Battle Mountain DO

036 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-014 2528 Acres
T.0100N, R.0370E, 21 MDM, NV
Sec. 031 PROT ALL;
032 PROT ALL;
033 PROT ALL;
034 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-015 2494 Acres
T.0090N, R.0372E, 21 MDM, NV
Sec. 004 PROT ALL;
005 PROT ALL;
007 PROT ALL;
008 PROT ALL;
009 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-016 1863 Acres
T.0090N, R.0372E, 21 MDM, NV
Sec. 016 PROT ALL;
017 PROT ALL;
020 PROT ALL;

021 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-017 2552 Acres
T.0090N, R.0372E, 21 MDM, NV
Sec. 018 PROT ALL;
019 PROT ALL;
030 PROT ALL;
031 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-018 1866 Acres
T.0090N, R.0372E, 21 MDM, NV
Sec. 028 PROT ALL;
029 PROT ALL;
032 PROT ALL;
033 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-020 1287 Acres
T.0080N, R.0380E, 21 MDM, NV
Sec. 009 ALL;
010 ALL;
Nye County
Battle Mountain DO

NV-15-06-021 1939 Acres
T.0090N, R.0380E, 21 MDM, NV
Sec. 004 LOTS 1-4;
004 S2N2,,S2;
005 LOTS 1-4;
005 S2N2,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
Nye County
Battle Mountain DO

NV-15-06-022 1942 Acres
T.0090N, R.0380E, 21 MDM, NV
Sec. 007 LOTS 1-4;
007 E2,E2W2;
008 ALL;
009 ALL;
Nye County
Battle Mountain DO

NV-15-06-023 1938 Acres
T.0090N, R.0380E, 21 MDM, NV
Sec. 016 ALL;
017 ALL;
018 LOTS 1-4;
018 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-024 1930 Acres
T.0090N, R.0380E, 21 MDM, NV
Sec. 019 LOTS 1-4;
019 E2,E2W2;
020 ALL;
029 ALL;
Nye County
Battle Mountain DO

NV-15-06-026 1920 Acres
T.0090N, R.0380E, 21 MDM, NV
Sec. 030 LOTS 1-4;
030 E2,E2W2;
031 LOTS 1-4;
031 E2,E2W2;
032 ALL;

Nye County
Battle Mountain DO

NV-15-06-027 482 Acres
T.0090N, R.0380E, 21 MDM, NV
Sec. 033 W2E2,W2;
Nye County
Battle Mountain DO

NV-15-06-028 1278 Acres
T.0100N, R.0380E, 21 MDM, NV
Sec. 003 LOTS 1-4;
003 S2N2,S2;
004 LOTS 1-4;
004 SWNW,S2;
Nye County
Battle Mountain DO

NV-15-06-029 1628 Acres
T.0100N, R.0380E, 21 MDM, NV
Sec. 008 E2;
009 ALL;
010 ALL;
Nye County
Battle Mountain DO

NV-15-06-030 1628 Acres
T.0100N, R.0380E, 21 MDM, NV
Sec. 015 ALL;
016 ALL;
017 E2;
Nye County
Battle Mountain DO

NV-15-06-031 1905 Acres
T.0100N, R.0380E, 21 MDM, NV
Sec. 020 ALL;
021 E2,N2NW,SWNW,SW;
022 ALL;
Nye County
Battle Mountain DO

NV-15-06-032 2432 Acres
T.0100N, R.0380E, 21 MDM, NV
Sec. 027 N2,SW;
028 ALL;
029 ALL;
030 LOTS 1-4;
030 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-033 2110 Acres
T.0100N, R.0380E, 21 MDM, NV
Sec. 031 LOTS 1-4;
031 E2,E2W2;
032 ALL;
033 ALL;
034 NW;
Nye County
Battle Mountain DO

NV-15-06-035 802 Acres
T.0120N, R.0380E, 21 MDM, NV
Sec. 029 W2;
030 SE;
031 NE;
032 NW;
Nye County
Battle Mountain DO

NV-15-06-036 623 Acres
T.0130N, R.0380E, 21 MDM, NV
Sec. 008 E2;
017 E2;
Nye County
Battle Mountain DO

NV-15-06-037 2590 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 001 LOTS 1-4;
001 S2N2,S2;
002 LOTS 1-4;
002 S2N2,S2;
011 ALL;
012 ALL;
018 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-038 1930 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 003 LOTS 1-4;
003 S2N2,S2;
004 LOTS 1-4;
004 S2N2,S2;
010 ALL;
Nye County
Battle Mountain DO

NV-15-06-039 1960 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 005 LOTS 1-4;
005 S2N2,S2;
008 ALL;
009 ALL;
Nye County
Battle Mountain DO

NV-15-06-040 1909 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
007 LOTS 1-4;
007 E2,E2W2;
018 LOTS 1-4;
Nye County
Battle Mountain DO

NV-15-06-041 2550 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 013 ALL;
014 ALL;
023 ALL;
024 ALL;
Nye County
Battle Mountain DO

NV-15-06-042 1934 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 015 ALL;
016 ALL;
017 ALL;
Nye County
Battle Mountain DO

NV-15-06-043 1953 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 019 LOTS 1-4;
019 E2,E2W2;
020 ALL;
029 ALL;
Nye County
Battle Mountain DO

NV-15-06-044 1927 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 021 ALL;
022 ALL;
028 ALL;
Nye County
Battle Mountain DO

Nye County
Battle Mountain DO

NV-15-06-045 2529 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 025 ALL;
026 ALL;
035 ALL;
036 ALL;
Nye County
Battle Mountain DO

NV-15-06-046 1928 Acres
T.0070N, R.0390E, 21 MDM, NV
Sec. 027 ALL;
033 ALL;
034 ALL;
Nye County
Battle Mountain DO

NV-15-06-064 1903 Acres
T.0030N, R.0400E, 21 MDM, NV
Sec. 019 LOTS 1-4;
019 E2,E2W2;
029 ALL;
030 LOTS 1-4;
030 E2,E2W2;
Esmeralda County
Battle Mountain DO

NV-15-06-069 1314 Acres
T.0080N, R.0400E, 21 MDM, NV
Sec. 019 LOTS 1-4;
019 E2,E2W2;
020 ALL;
Nye County
Battle Mountain DO

NV-15-06-070 1266 Acres
T.0080N, R.0400E, 21 MDM, NV
Sec. 021 ALL;
022 ALL;

NV-15-06-071 2058 Acres
T.0080N, R.0400E, 21 MDM, NV
Sec. 026 ALL;
027 ALL;
028 ALL;
Nye County
Battle Mountain DO

NV-15-06-072 2607 Acres
T.0080N, R.0400E, 21 MDM, NV
Sec. 029 ALL;
030 LOTS 1-4;
030 E2,E2W2;
031 LOTS 1-4;
031 E2,E2W2;
032 ALL;
Nye County
Battle Mountain DO

NV-15-06-073 2568 Acres
T.0080N, R.0400E, 21 MDM, NV
Sec. 033 ALL;
034 ALL;
035 ALL;
036 ALL;
Nye County
Battle Mountain DO

NV-15-06-088 1886 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 001 LOTS 1-4;
001 S2N2,S2;
002 LOTS 1-4;
002 S2N2,S2;
003 LOTS 1-4;
003 S2N2,S2;
Nye County
Battle Mountain DO

NV-15-06-089 1887 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 004 LOTS 1-4;
004 S2N2,S2;
005 LOTS 1-4;
005 S2N2,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
Nye County
Battle Mountain DO

NV-15-06-090 319 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 007 E2;
Nye County
Battle Mountain DO

NV-15-06-091 1915 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 008 ALL;
019 LOTS 1-4;
019 E2,E2W2;
020 ALL;
Nye County
Battle Mountain DO

NV-15-06-092 2531 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 009 ALL;
010 ALL;
011 ALL;
012 ALL;
Nye County
Battle Mountain DO

NV-15-06-093 2533 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 013 ALL;
014 ALL;
015 ALL;
016 ALL;
Nye County
Battle Mountain DO

NV-15-06-094 2535 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 021 ALL;
022 ALL;
023 ALL;
024 ALL;
Nye County
Battle Mountain DO

NV-15-06-095 2601 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 027 ALL;
028 ALL;
033 ALL;
034 ALL;
Nye County
Battle Mountain DO

NV-15-06-096 2587 Acres
T.0060N, R.0410E, 21 MDM, NV
Sec. 029 ALL;
030 LOTS 1-4;
030 E2,E2W2;
031 LOTS 1-4;
031 E2,E2W2;
032 ALL;
Nye County
Battle Mountain DO

NV-15-06-097 2453 Acres
T.0070N, R.0410E, 21 MDM, NV
Sec. 001 LOTS 1-4;

001 S2N2,S2;
002 LOTS 1-4;
002 S2N2,S2;
003 LOTS 1-4;
003 S2N2,S2;
004 LOTS 1-4;
004 S2N2,S2;
Nye County
Battle Mountain DO

NV-15-06-098 2470 Acres
T.0070N, R.0410E, 21 MDM, NV
Sec. 005 LOTS 1-4;
005 S2N2,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
007 LOTS 1-4;
007 E2,E2W2;
008 ALL;
Nye County
Battle Mountain DO

NV-15-06-101 2538 Acres
T.0070N, R.0410E, 21 MDM, NV
Sec. 017 ALL;
018 LOTS 1-4;
018 E2,E2W2;
019 LOTS 1-4;
019 E2,E2W2;
020 ALL;
Nye County
Battle Mountain DO

NV-15-06-102 2494 Acres
T.0070N, R.0410E, 21 MDM, NV
Sec. 021 ALL;
022 ALL;
023 ALL;
024 ALL;
Nye County
Battle Mountain DO

NV-15-06-099 2479 Acres
T.0070N, R.0410E, 21 MDM, NV
Sec. 009 ALL;
010 ALL;
011 ALL;
012 ALL;
Nye County
Battle Mountain DO

NV-15-06-100 2482 Acres
T.0070N, R.0410E, 21 MDM, NV
Sec. 013 ALL;
014 ALL;
015 ALL;
016 ALL;
Nye County
Battle Mountain DO

NV-15-06-103 2488 Acres
T.0070N, R.0410E, 21 MDM, NV
Sec. 025 ALL;
026 ALL;
027 ALL;
028 ALL;

NV-15-06-104 2535 Acres
T.0070N, R.0410E, 21 MDM, NV
Sec. 029 ALL;
030 LOTS 1-4;
030 E2,E2W2;
031 LOTS 1-4;
031 E2,E2W2;
032 ALL;
Nye County
Battle Mountain DO
NVN081418 - FEDERAL USE PERMIT

NV-15-06-105 2516 Acres

T.0070N, R.0410E, 21 MDM, NV
Sec. 033 ALL;
034 ALL;
035 ALL;
036 ALL;
Nye County
Battle Mountain DO
NVN081418 - SAND AND GRAVEL

NV-15-06-106 1278 Acres
T.0080N, R.0410E, 21 MDM, NV
Sec. 026 PROT ALL;
027 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-131 1756 Acres
T.0050N, R.0420E, 21 MDM, NV
Sec. 019 PROT ALL;
020 PROT ALL;
029 PROT N2;
030 PROT NE;
Nye County
Battle Mountain DO

NV-15-06-132 2555 Acres
T.0050N, R.0420E, 21 MDM, NV
Sec. 021 PROT ALL;
022 PROT ALL;
027 PROT ALL;
028 PROT PART;
Nye County
Battle Mountain DO

NV-15-06-133 2568 Acres
T.0050N, R.0420E, 21 MDM, NV
Sec. 023 PROT ALL;
024 PROT ALL;
025 PROT ALL;
026 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-135 1755 Acres
T.0050N, R.0420E, 21 MDM, NV
Sec. 034 PROT SE,N2;
035 PROT ALL;
036 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-136 1917 Acres
T.0060N, R.0420E, 21 MDM, NV
Sec. 002 LOTS 1-4;
002 S2N2,S2;
003 LOTS 1-4;
003 S2N2,S2;
004 LOTS 1-4;
004 S2N2,S2;
Nye County
Battle Mountain DO

NV-15-06-137 1907 Acres
T.0060N, R.0420E, 21 MDM, NV
Sec. 005 LOTS 1-4;
005 S2N2,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
007 LOTS 1-4;
007 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-138 2232 Acres
T.0060N, R.0420E, 21 MDM, NV
Sec. 008 ALL;
009 ALL;
010 ALL;
011 N2;
Nye County
Battle Mountain DO

NV-15-06-139 1902 Acres
T.0060N, R.0420E, 21 MDM, NV
Sec. 013 PROT ALL;
014 PROT ALL;
015 NW;
015 PROT E2,SW;
Nye County
Battle Mountain DO

NV-15-06-140 1904 Acres
T.0060N, R.0420E, 21 MDM, NV
Sec. 016 N2,SW;
016 PROT SE;
017 ALL;
018 LOTS 1-4;
018 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-141 1289 Acres
T.0060N, R.0420E, 21 MDM, NV
Sec. 019 LOTS 1-4;
019 E2,E2W2;
020 N2;
020 PROT S2;
Nye County
Battle Mountain DO

NV-15-06-142 1912 Acres
T.0060N, R.0420E, 21 MDM, NV
Sec. 022 PROT ALL;
023 PROT ALL;
024 PROT ALL;
Nye County
Battle Mountain DO

NV-15-06-145 1948 Acres
T.0070N, R.0420E, 21 MDM, NV
Sec. 002 LOTS 1-4;
002 S2N2,S2;
003 LOTS 1-4;
003 S2N2,S2;
004 LOTS 1-4;
004 S2N2,S2;
Nye County
Battle Mountain DO

NV-15-06-146 2584 Acres
T.0070N, R.0420E, 21 MDM, NV
Sec. 005 LOTS 1-4;
005 S2N2,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
007 LOTS 1-4;
007 E2,E2W2;
008 ALL;
Nye County
Battle Mountain DO

NV-15-06-147 1990 Acres
T.0070N, R.0420E, 21 MDM, NV
Sec. 009 ALL;
010 ALL;
011 ALL;
Nye County
Battle Mountain DO

NV-15-06-148 1955 Acres
T.0070N, R.0420E, 21 MDM, NV
Sec. 014 ALL;
015 ALL;
016 ALL;
Nye County

Battle Mountain DO

NV-15-06-149 1960 Acres
T.0070N, R.0420E, 21 MDM, NV
Sec. 021 ALL;
022 ALL;
023 ALL;
Nye County
Battle Mountain DO

NV-15-06-150 2577 Acres
T.0070N, R.0420E, 21 MDM, NV
Sec. 025 ALL;
026 ALL;
035 ALL;
036 ALL;
Nye County
Battle Mountain DO

NV-15-06-151 2557 Acres
T.0070N, R.0420E, 21 MDM, NV
Sec. 027 ALL;
028 ALL;
033 ALL;
034 ALL;
Nye County
Battle Mountain DO

NV-15-06-152 2515 Acres
T.0070N, R.0420E, 21 MDM, NV
Sec. 029 ALL;
030 LOTS 1-4;
030 E2,E2W2;
031 LOTS 1-4;
031 E2,E2W2;
032 ALL;
Nye County

Battle Mountain DO

NV-15-06-156 285 Acres
T.0010N, R.0430E, 21 MDM, NV
Sec. 012 NWNE,SEE2,NE;
Nye County
Battle Mountain DO

NV-15-06-162 479 Acres
T.0080N, R.0440E, 21 MDM, NV
Sec. 035 LOTS 3,4;
035 N2SE;
036 LOTS 1-4;
036 N2S2;
Nye County
Battle Mountain DO

NV-15-06-163 2529 Acres
T.0060N, R.0450E, 21 MDM, NV
Sec. 006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
008 ALL;
009 ALL;
010 ALL;
Nye County
Battle Mountain DO

NV-15-06-164 1892 Acres
T.0060N, R.0450E, 21 MDM, NV
Sec. 015 ALL;
016 ALL;
017 ALL;
Nye County
Battle Mountain DO

NV-15-06-165 1895 Acres
T.0060N, R.0450E, 21 MDM, NV
Sec. 020 ALL;
021 ALL;
022 ALL;
Nye County
Battle Mountain DO

NV-15-06-166 1904 Acres
T.0060N, R.0450E, 21 MDM, NV
Sec. 027 ALL;
028 ALL;
029 ALL;
Nye County
Battle Mountain DO

NV-15-06-167 1902 Acres
T.0060N, R.0450E, 21 MDM, NV
Sec. 032 ALL;
033 ALL;
034 ALL;
Nye County
Battle Mountain DO

NV-15-06-168 1742 Acres
T.0070N, R.0450E, 21 MDM, NV
Sec. 005 LOTS 1-4;
005 S2N2,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
007 LOTS 1-4;
007 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-169 1750 Acres
T.0070N, R.0450E, 21 MDM, NV
Sec. 008 ALL;
017 ALL;
018 LOTS 1-4;
018 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-170 2432 Acres
T.0070N, R.0450E, 21 MDM, NV
Sec. 019 LOTS 1-4;
019 E2,E2W2;
020 ALL;
021 ALL;
022 ALL;
Nye County
Battle Mountain DO
NVN06379 - PUBLIC WATER RESERVE 107

NV-15-06-171 2453 Acres
T.0070N, R.0450E, 21 MDM, NV
Sec. 027 ALL;
028 ALL;
029 ALL;
030 LOTS 1-4;
030 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-172 2455 Acres
T.0070N, R.0450E, 21 MDM, NV
Sec. 031 LOTS 1-4;
031 E2,E2W2;
032 ALL;
033 ALL;
034 ALL;
Nye County

NV-15-06-173 1919 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 001 LOTS 1-4;
001 S2N2,S2;
002 LOTS 1-4;
002 S2N2,S2;
012 ALL;
Nye County
Battle Mountain DO

NV-15-06-174 1934 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 003 LOTS 1-4;
003 S2N2,S2;
004 LOTS 1-4;
004 S2N2,S2;
010 ALL;
Nye County
Battle Mountain DO

NV-15-06-175 1945 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 005 LOTS 1-4;
005 S2N2,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
008 ALL;
Nye County
Battle Mountain DO

NV-15-06-176 1955 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 007 LOTS 1-4;
007 E2,E2W2;
017 ALL;
018 LOTS 1-4;
018 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-177 1943 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 009 ALL;
015 ALL;
016 ALL;
Nye County
Battle Mountain DO

NV-15-06-178 1924 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 011 ALL;
013 ALL;
014 ALL;
Nye County
Battle Mountain DO

NV-15-06-179 1962 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 019 LOTS 1-4;
019 E2,E2W2;
020 ALL;
029 ALL;
Nye County
Battle Mountain DO

NV-15-06-180 2576 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 021 ALL;
022 ALL;
023 ALL;
024 ALL;
Nye County
Battle Mountain DO

NV-15-06-181 2574 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 025 ALL;
026 ALL;

027 ALL;
028 ALL;
Nye County
Battle Mountain DO

NV-15-06-182 1981 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 030 LOTS 1-4;
030 E2,E2W2;
031 LOTS 1-4;
031 E2,E2W2;
032 ALL;
Nye County
Battle Mountain DO

NV-15-06-183 2584 Acres
T.0020N, R.0460E, 21 MDM, NV
Sec. 033 ALL;
034 ALL;
035 ALL;
036 ALL;
Nye County
Battle Mountain DO

NV-15-06-184 2532 Acres
T.0030N, R.0470E, 21 MDM, NV
Sec. 009 ALL;
010 ALL;
015 ALL;
016 ALL;
Nye County
Battle Mountain DO

NV-15-06-185 2537 Acres
T.0030N, R.0470E, 21 MDM, NV
Sec. 013 ALL;
014 ALL;
023 ALL;
024 ALL;
Nye County
Battle Mountain DO

NV-15-06-186 2558 Acres
T.0030N, R.0470E, 21 MDM, NV
019 E2,E2W2;
020 ALL;
021 ALL;
022 ALL;
Nye County
Battle Mountain DO

NV-15-06-187 2538 Acres
T.0030N, R.0470E, 21 MDM, NV
Sec. 025 ALL;
026 ALL;
035 ALL;
036 ALL;
Nye County
Battle Mountain DO

NV-15-06-188 2575 Acres
T.0030N, R.0470E, 21 MDM, NV
Sec. 027 ALL;
028 ALL;
029 ALL;
030 LOTS 1-4;
030 E2,E2W2;
Nye County
Battle Mountain DO

NV-15-06-189 1735 Acres
T.0040N, R.0470E, 21 MDM, NV
Sec. 001 LOTS 1-4;
001 S2N2,S2;
002 SE;
011 E2;
012 ALL;
Nye County

Battle Mountain DO

NV-15-06-190 1598 Acres
T.0040N, R.0470E, 21 MDM, NV
Sec. 013 ALL;
014 E2,SW;
015 S2;
016 SE;
Nye County
Battle Mountain DO

NV-15-06-191 2243 Acres
T.0040N, R.0470E, 21 MDM, NV
Sec. 021 E2;
022 ALL;
023 ALL;
024 ALL;
Nye County
Battle Mountain DO

NV-15-06-192 2241 Acres
T.0040N, R.0470E, 21 MDM, NV
Sec. 025 ALL;
026 ALL;
027 ALL;
028 E2;
Nye County
Battle Mountain DO

NV-15-06-193 2549 Acres
T.0040N, R.0470E, 21 MDM, NV
Sec. 033 ALL;
034 ALL;
035 ALL;
036 ALL;
Nye County

Battle Mountain DO

NV-15-06-194 2557 Acres
T.0170N, R.0520E, 21 MDM, NV
Sec. 001 PROT ALL;
002 PROT ALL;
012 PROT ALL;
013 PROT ALL;
Eureka County
Battle Mountain DO

NV-15-06-195 2549 Acres
T.0170N, R.0520E, 21 MDM, NV
Sec. 019 PROT ALL;
020 PROT ALL;
021 PROT ALL;
022 PROT ALL;
Eureka County
Battle Mountain DO

NV-15-06-196 1918 Acres
T.0170N, R.0520E, 21 MDM, NV
Sec. 023 PROT ALL;
024 PROT ALL;
025 PROT ALL;
Eureka County
Battle Mountain DO

NV-15-06-197 1918 Acres
T.0170N, R.0520E, 21 MDM, NV
Sec. 026 PROT ALL;
027 PROT ALL;
035 PROT ALL;
Eureka County
Battle Mountain DO

Number of Parcels (including partials) - 124

Total Acreage – 256,401

Total number of Parcels with Presale Offers - 0

Parcel Number of Parcels with Presale Offers - 0

Total Acreage With Presale Offers - 0

Any portion of the listed lands may be deleted upon determination that such lands are not available for leasing.

APPENDIX B

OIL AND GAS LEASE PARCEL STIPULATIONS AND NOTICES

TIMING LIMITATION STIPULATION

Migratory Birds

Surface-disturbing activities during the migratory bird nesting season (March 1 to July 31) may be restricted in order to avoid potential violation of the Migratory Bird Treaty Act. Appropriate inventories of migratory birds shall be conducted during analysis of actual site development. If active nests are located, or if other evidence of nesting is observed (mating pairs, territorial defense, carrying of nesting material, transporting of food), the proponent shall coordinate with BLM to establish appropriate protection measures for the nesting sites. Protection measures may include avoidance or restricting or excluding development in certain areas until nests and nesting birds will not be disturbed. After July 31, no further avian survey, will be conducted until the following year.

Parcel	Description of Lands
NV-15-06-001 THRU **NV-15-06-197**	All Lands

LEASE NOTICE

Threatened, Endangered, and Special Status Species

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it complete its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. &1531 et seq., including completion of any required procedure for conference or consultation.

Authority: BLM Washington Office Instruction Memorandum 2002-174; Endangered Species Act

Plants
A list of BLM special status plant species can be found in Appendix E, and seasonally appropriate surveys for the respective species by a qualified biologist will be required before surface disturbance will be authorized.

Parcels	**Description of Lands**
NV-15-06-001 THRU **NV-15-06-197**	All Lands

MATERIAL SITE STIPULATION

The lessee accepts this lease subject to the authorized use by local or state government to remove road building material from the land embraced in the parcels listed below and agrees that its operations will not interfere with the material operations of the Department of Transportation.

Parcels	Description of Lands
NV-15-06-030	T10N R38E section 16
NV-15-06-065	T03N R40E section 28
NV-15-06-105	T07N R41E section 33
NV-15-06-108	T01N R42E section 04
NV-15-06-115	T01N R42E section 27
NV-15-06-120	T02N R42E section 28 and 33
NV-15-06-160	T08N R43E section 19

LEASE NOTICE

Cultural and Paleontological Resources

Stipulations for Cultural Resources
The Archeological Resource Protection Act (ARPA: 43 CFR 7.4, 7.14, 7.15, 7.16) provides for civil and/or criminal penalties for the disturbance of archaeological resources on federal lands. In addition, the Native American Graves Protection and Repatriation Act (NAGPRA: 43 CFR 10) protects items of cultural patrimony, Native American funerary items, Native American remains and sacred objects. This lease may be found to contain historic properties and/or resources protected under ARPA, NAGPRA, the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Executive Order 13007, and/or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.

In the event Native American skeletal remains, funerary items, scared items, or objects of cultural patrimony, are discovered during any phase of project implementation, all operations must cease in the vicinity of the discovery and adequate protection must be provided to the discovery. The BLM must be notified immediately, by telephone, with written confirmation to follow (43 CFR 10.4 (c), (d), (g); and Nevada State Protocol Agreement VIII (B). Notification shall be made to Doug Furtado, District Manager, Battle Mountain District Office, 50 Bastian Road, Battle Mountain, NV, 89820, (775-635-4000). No activity in the vicinity of the discovery shall resume until the operator has been issued a Notice to Proceed by the Authorized Officer.

Stipulations for Paleontological Resources
Paleontological resources are managed and preserved under various authorities, including the Omnibus Act (PRPA), the Federal Cave Resources Protection Act (16 U.S.C. 4301 et seq.) and the Archaeological Resources Protection Act (16 U.S.C. 470 et seq.) which establishes penalties for the unauthorized excavation, removal, or damage to a paleontological resource when it is found in a direct physical relationship with an archaeological resource. In addition, FLPMA establishes penalties for the theft and/or degradation of federal property which includes paleontological resources. The BLM will not authorize any ground-disturbing activities that may affect significant paleontological resources prior to assessing impacts in accordance with BLM IM No. 2009-011 and other relevant authorities. The BLM may require modification to exploration or development proposals to protect such significant paleontological resources, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided or mitigated.

Paleontological resources constitute a fragile and non-renewable scientific record of the history of life on earth. Although no paleontological resources are known or identified in the immediate area, this project may have an unintended adverse effect on such resources. The operator should note that fossils are not part of the mineral estate. Paleontological resources are protected by the Paleontological Resources Protection Act (OPLA-PRP: Omnibus Public Land Management Act of 2009 Paleontological Resources Preservation Subtitle 123 Stat. 1172, 16 U.S.C. 470aaa et seq.) which establishes criminal and civil penalties. The operator should also be aware that if paleontological resources are found in direct association with cultural resources, then such occurrences are subject to Archaeological Resource Protection Act (ARPA: 43 CFR 7.4, 7.14, 7.15, 7.16) provisions. OPLA-PRP requires that the nature and location of paleontological resources on public lands be kept confidential. If paleontological resources are discovered, the operator must cease operations in the vicinity of the discovery and ensure adequate protection to the discovery, then notify the BLM immediately, by telephone, with written confirmation to follow. Notification should be made to the BLM, Battle Mountain District Office, 50 Bastian Road, Battle Mountain, NV, 89820, (775-635-4000). No activity in the vicinity of the discovery should resume until the operator has been issued a Notice to Proceed by the Authorized Officer.

Parcels	**Description of Lands**
NV-15-06-001	
THRU	All Lands
NV-15-06-197	

NOTICE TO LESSEE

Wild Horse and Burros

The use of helicopter below 500' AGL would be prohibited between March 1 and June 30 to prevent disruption during the foaling period and orphan or abandoned foals.

The BLM has long standing policy about the use of aircraft during the foaling period and is essentially restricted from using aircraft to inventory or gather wild horses during the peak foaling season. Wild horses will run when in the presence of aircraft. Mares may not wait for foals and may abandon them, especially when foals are young.

If operations cause a water source to become unavailable to wild horses, the Authorized Officer may require a new well to be drilled or another water development to be constructed in the general area to provide adequate water for the wild horses. If the lease area is within an HMA, the Field Manager may require additional measures for the protection of wild horses such as seasonal restrictions during the peak foaling period. Additional measures could include placement of equipment away from important water sources, or placement of equipment outside of areas suitable for use or movement by wild horses. Please refer to Tables 6-11 for the list of proposed parcels located within HMAs.

NOTICE TO LESSEE

Fire

The following precautionary measures should be taken to prevent wildland fires. In the event your operations should start a fire, you could be held liable for all suppression costs.

- All vehicles should carry fire extinguishers and a minimum of 10 gallons of water.
- Adequate fire-fighting equipment i.e. shovel, pulaski, extinguisher(s) and a minimum10 gallons of water should be kept at the drill site(s).
- Vehicle catalytic converters should be inspected often and cleaned of all brush and grass debris.
- When conducting welding operations, they should be conducted in an area free from or mostly free from vegetation. A minimum of 10 gallons water and a shovel should be on hand to extinguish any fires created from the sparks. Extra personnel should be at the welding site to watch for fires created by welding sparks.
- Report wildland fires immediately to the BLM Central Nevada Interagency Dispatch Center (CNIDC) at (775) 623-3444. Helpful information to reported is location (latitude and longitude if possible), what's burning, time started, who/what is near the fire and direction of fire spread.
- When conducting operations during the months of May through September, the operator must contact the BLM Battle Mountain District Office, Division of Fire and Aviation at

(775) 635-4000 to find out about any fire restrictions in place for the area of operation and to advise this office of approximate beginning and ending dates for your activities.

All Parcels

NOTICE TO LESSEE

Native American Consultation

In accordance with the National Historic Preservation Act (P.L. 89-665), the National Environmental Policy Act (P.L. 91-190), the Federal Land Policy and Management Act (P.L. 94-579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (p.L. 101-601) and Executive Order 13007, the BLM must also provide affected tribes an opportunity to comment and consult on the proposed project. BLM must attempt to limit, reduce, or possibly eliminate any negative impacts to Native American traditional/cultural/spiritual sites, activities and resources.

BLM reserves the right to deny or alter proposed activities associated with any surface occupancy that results from Oil, Gas and Geothermal leasing. Maintaining physical and spiritual integrity of certain locations within the BMD administrative boundary is detrimental to present and future cultural/spiritual/traditional activities. In accordance with Federal legislation and executive orders, Federal agencies must consider the impacts their actions may have to Native American traditions and religious practices. Consequently, the BLM must take steps to identify locations having traditional/cultural or religious values to Native Americans and insure that its actions do not unduly or unnecessarily burden the pursuit of traditional religion or traditional lifeways.

(All parcels included in Appendix A are recommended to include this notice. Due to the sensitivity of the unique resources of the Big Smoky Valley, Native American related stipulations should be applied. Companies or individuals moving forward with lease purchases within or in close proximity to sensitive areas noted above can expect an extensive, complex and lengthy Native American consultation process.)

All Parcels

NOTICE TO LESSEE

General Occupancy

Surface occupancy may be restricted for specific periods by the BLM's authorized officer for reasons that include, but are not limited to (a) extended periods of high soil moisture or runoff when unusual road damage or land surface rutting can occur and (b) disturbance activity that could have a significant effects on sage-grouse breeding or brood-rearing, raptor nesting, or crucial deer or pronghorn antelope wintering areas.

Warming and cooling trends during winter, spring runoff events and other large precipitation events can contribute to extended periods of high soil moisture or runoff that can cause road damage or land surface rutting. These issues can be compounded in areas where slopes are Greater than 30%.

All Parcels

APPENDIX C

PROPOSED DEFERRED PARCELS

TFO Greater Sage-grouse Habitat Proposed Parcel Deferral List

Pending the US Fish and Wildlife Service's (FWS) decision to list the Greater Sage-grouse (GSG) under the Endangered Species Act, the BLM has proposed the following parcels for deferral from the oil and gas lease sale of 2015. Further degradation of GSG habitat prior to FWS's decision would/could contribute to the lack of habitat protections that the FWS has deemed a contributing factor to the decline in GSG populations. Initially the parcels below were not identified as GSG habitat, but bordered identified Preliminary Priority Habitat (PPH) and/or Preliminary General Habitat (PGH). During a site visit conducted by two BLM wildlife biologists, the following parcels were found to have habitat qualities consistent with PGH/PPH.

Parcel	Description of Lands
NV-15-06-028	T.10N., R.38E.; Sec. 02
NV-15-06-029	T.10N., R.38E.; Sec. 11
NV-15-06-030	T.10N., R.38E.; Sec. 14
NV-15-06-031	T.10N., R.38E.; Sec. 23
NV-15-06-034	All Lands
NV-15-06-036	T.13N., R.38E.; Sec. 9, 16, 28
NV-15-06-068	All Lands
NV-15-06-069	T.8N., R.40E.; Sec. 18
NV-15-06-070	T.8N., R.40E.; Sec. 23

NV-15-06-071	T.8N., R.40E.; Sec. 25

The aforementioned parcels and/or portions of parcels are located within areas where Wyoming sage-brush and mixed shrub habitats exist, near perennial water and adjacent to mapped GSG habitat within the Tonopah Field Office. The proposed deferred areas are primarily used as winter range for GSG, but some lekking/brood rearing and summer use could occur. Healthy grasses and some forbs occur in these areas. Habitat is evaluated based on distance from perennial water, sagebrush and other shrub cover (height and species is considered), amount of grass and forb understory, and contiguity of seasonal habitat (ie summer, winter, lekking/brood rearing habitat). Furthermore, portions of parcels 68, 69, 70, 71, and 106 are identified as crucial mule deer winter range (NDOW, 2014), in addition to GSG habitat.

TFO Desert Bighorn Sheep Habitat Proposed Parcel Deferral List

The following parcels are known to be occupied by desert bighorn sheep (*Ovis canadensis nelsoni)*, a Nevada State and BLM SSS.

Parcel	Description of Lands
NV-15-06-050	All Lands
NV-15-06-051	All Lands
NV-15-06-052	All Lands
NV-15-06-053	All Lands
NV-15-06-054	All Lands
NV-15-06-055	All Lands
NV-15-06-056	All Lands
NV-15-06-057	All Lands
NV-15-06-058	All Lands
NV-15-06-059	All Lands
NV-15-06-060	All Lands
NV-15-06-063	All Lands
NV-15-06-065	All Lands
NV-15-06-066	All Lands
NV-15-06-067	All Lands
NV-15-06-080	All Lands
NV-15-06-081	All Lands
NV-15-06-082	All Lands
NV-15-06-083	All Lands
NV-15-06-084	All Lands
NV-15-06-085	All Lands

NV-15-06-127	All Lands
NV-15-06-128	All Lands
NV-15-06-129	All Lands
NV-15-06-130	All Lands
NV-15-06-143	All Lands
NV-15-06-144	All Lands

Other TFO Wildlife Proposed Habitat Deferrals

The following parcels are located north of the Gabb's Pole-line road at the south end of the Toiyabe Mountain Range between Ione and Big Smoky Valley's. The parcels have wetlands associated with them which provide seasonal and/or year-round habitat for a variety of species. One spring source (Warm Spring), and one intermittently flowing riparian area (over one mile surface water was identified, November 2014), which supports a variety of riparian vegetation. Notable wildlife species known to utilize the wetland habitats include pronghorn antelope, mule deer, coyotes, small mammals, and a variety of avifauna - including intermittent use by Greater sage-grouse. Wetland habitats within the Tonopah Field Office are increasingly uncommon and a vital component for the prolonged existence of wildlife species in the area.

Parcel	Description of Lands
NV-15-06-019	All Lands
NV-15-06-020	T.8N., R.38E.; Sec. 11, 12
NV-15-06-025	All Lands
NV-15-06-027	T.9N., R.38E.; Sec. 33 - E2E2; Sec. 34, 35, 36

Proposed Minerals Deferrals

The following parcels lie within a locatable minerals approved Plan of Operations boundary

Parcel	Land Description
NV-15-06-116	All Lands
NV-15-06-118	All Lands

NV-15-06-128	All Lands
NV-15-06-143	All Lands
NV-15-06-160	All Lands
NV-15-06-161	All Lands

The following parcels were proposed for deferral because of resource concerns or conflicts identified by the BLM IDT or through public responses to scoping. A combination of resource conflicts may have contributed to the rational for deferral. Resource elements considered for proposed lease deferrals includes: shallow ground water table, floodplains, wetland & riparian, playas, potential Extensive Recreation Area (ERMA), potential Special Recreation Area (SRMA), potential lands with wilderness characteristics (LWC), occupied desert bighorn sheep habitat (DBS), raptor nest, right-of-ways (ROWs), herd management areas (HMAs)

Proposed Deferred parcel	Acres	Rationale
NV-15-06-019	1,926	The parcel was deferred the previous year. It is located on a wetland/floodplain. ROW is present.
NV-15-06-020	1,286	The parcel was deferred the previous year. It is located on wetland/floodplain. ROW is present.
NV-15-06-025	2,584	This parcel is located on a wetland/floodplain, and also on the pronghorn travel corridor-habitat values.
NV-15-06-027	2,095	This parcel is located on wetland/floodplains. ROW and raptor nests are present.
NV-15-06-028	440	This parcel is located on floodplains and has a ROW present.
NV-15-06-029	326	This parcel is located on floodplains and has a ROW present.

NV-15-06-030	324	This parcel is located on floodplains and has a ROW present.
NV-15-06-031	324	This parcel is located on floodplains and has a ROW present.
NV-15-06-047	970	This parcel has a playa present, 0-25 shall groundwater, numerous eligible cultural resources present, floodplains and both kinds of wetlands, and water body.
NV-15-06-048	1,765	This parcel has a playa present, 0-25 shallow groundwater, numerous eligible cultural resources present, floodplains and both kinds of wetlands, and water body.
NV-15-06-049	1,367	This parcel has faults present, a ROW present, and is moderately used by horses.
NV-15-06-050	2,011	This parcel has faults present, is occupied by DBS, LWC, and ERMA present.
NV-15-06-051	2,002	This parcel has faults present, raptor nests present, geothermal is present, the HMA is present/full, DBS occupied, LWC present, and ERMA is present.
NV-15-06-052	2,558	This parcel has a ROW present, is DBS occupied, the HMA is present/full, ERMA is present, and LWC are present.
NV-15-06-053	2,566	This parcel is located on floodplains and has springs present, a ROW present, Special Species (SS) are present, DBS occupied, HMA is present/full, ERMA and LWC present.
NV-15-06-054	1,941	This parcel has faults present, a ROW present, is DBS occupied, the HMA is present/full,

		ERMA and LWC present.
NV-15-06-055	1,290	This parcel is DBS occupied, the HMA is present/full, and ERMA is present.
NV-15-06-056	2,566	This parcel is located on floodplains and has springs present. SS are present, DBS partially occupied, HMA is present/full, ERMA and LWC present.
NV-15-06-057	2,569	This parcel is located on floodplains and has springs present, ROW avoidance areas present, SS are present, DBS occupied, HMA is present/full, and ERMA and LWC are present.
NV-15-06-058	1,929	This parcel is located on floodplains and has springs present. ROW avoidance areas are present, SS are present, it's DBS occupied, the HMA is present/full, ERMA is present, and LWC also present.
NV-15-06-059	1,927	This parcel is located on floodplains and has springs present. ROW avoidance areas are present, DBS occupied, HMA is present/full, ERMA and LWC's present.
NV-15-06-060	1,930	This parcel is located on floodplains and has springs present. DBS occupied HMA present/full, ERMA and LWC's are present.
NV-15-06-061	1,963	This parcel is located on floodplains. Water body and both wetlands are present. ROW present (solar energy zone), ROW power lines present. A gravel pit is in the area, shallow groundwater, and there are possible cultural impacts.
NV-15-06-062	1,930	This parcel has geothermal present. ERMA is present, shallow groundwater, cultural

		resources are present, and the soil has high-wind erosion.
NV-15-06-063	2,549	This parcel is located on floodplains. Range improvements are present, it is DBS occupied, and ERMA is present.
NV-15-06-065	2,544	This parcel is located on floodplains. Range improvements are present, geothermal is present, and NDOT has a gravel pit in the area. It is DBS occupied, and ERMA is present.
NV-15-06-066	1,902	This parcel is located on floodplains, faults are present, and range improvements are present. There is geothermal in area, it is DBS occupied, the HMA is present/full, ERMA and LWC's are present.
NV-15-06-067	1,953	This parcel is located on floodplains, there are faults present, and there are range improvements present. There is geothermal in the area, it is DBS occupied, the HMA is present/full, ERMA and LWC's are present.
NV-15-06-068	2,551	This parcel has a water body in the area. There are SS present, and it is crucial winter area for mule deer.
NV-15-06-069	645	Water body in area, spotted frog present, and is a crucial winter area for mule deer.
NV-15-06-071	638	Encumbrance present, and is a crucial winter area for mule deer.
NV-15-06-074	1,525	Split parcel. Located on floodplains, 0-25 shallow groundwater, a ROW is present, and LWC are present.
NV-15-06-075	1,557	Split parcel. Water body and both wetlands are present, 0-25 shallow groundwater, a ROW is present, and LWC are present.
NV-15-06-076	1,610	Water body and both wetlands are present, 0-25 shallow groundwater, a ROW is present, and LWC are present.
NV-15-06-077	2,097	

		Water body and both wetlands are present, 0-25 shallow groundwater, range improvements are present, and LWC are present.
NV-15-06-078	1,613	This parcel is located on floodplains, water body and both wetlands are present, 0-25 shallow groundwater present. There is a ROW present, the HMA is present/full, and LWC are present.
NV-15-06-079	2,603	This parcel is located on floodplains, there is a ROW present, it's DBS occupied, the HMA is present/full, and ERMA is present.
NV-15-06-080	1,845	This parcel is located on floodplains, there is a ROW present, it's DBS occupied, the HMA is present/full, and ERMA is present.
NV-15-06-081	1,911	Faults are present, there is a ROW present, it is DBS occupied, the HMA is present/full, and ERMA is present.
NV-15-06-082	2,619	This parcel is located on floodplains, range improvements are present, it's DBS occupied, the HMA is present/full, and ERMA is present.
NV-15-06-083	2,584	This parcel is located on floodplains, there is a ROW present, it's DBS occupied, the HMA is present/full, and ERMA is present.
NV-15-06-084	2,588	This parcel is located on floodplains, it's DBS occupied, the HMA is present/full, and ERMA is present.
NV-15-06-085	2,579	This parcel is located on floodplains, it's DBS occupied, the HMA is present/full, and ERMA is present.
NV-15-06-086	2,593	This parcel is located on floodplains, a water body is present, the HMA is present/full, and ERMA is present.
NV-15-06-087	2,607	Split parcel. This parcel is located on floodplains, the HMA is present/full, and ERMA is present.
NV-15-06-106	1,278	

		This parcel is located on floodplains, there's a ROW present, and its mule deer crucial winter range.
NV-15-06-107	1,135	Split parcel. ERMA is present
NV-15-06-108	1,903	NDOT ROW present, and ERMA is present.
NV-15-06-109	1,920	This parcel is located on floodplains, there is a ROW present, and ERMA is present.
NV-15-06-110	2,564	This parcel is located on floodplains, there is a ROW present, there are five raptor nests located in area, and ERMA is present.
NV-15-06-111	2,608	Faults are present, range improvements are present, and ERMA is present.
NV-15-06-112	1,918	There is a ROW present and ERMA is present.
NV-15-06-113	2,573	ERMA is present.
NV-15-06-114	2,611	Faults are present, the drinking water could be affected, a ROW is present, and ERMA is present.
NV-15-06-115	1,938	The drinking water could be affected, and ERMA is present.
NV-15-06-116	2,576	ERMA is present.
NV-15-06-117	1,832	ERMA is present.
NV-15-06-118	1,601	Parcel is located on floodplains, faults are present, range improvements are present, and ERMA is present.
NV-15-06-119	2,597	Parcel is located on floodplains, faults are present, a ROW is present, and ERMA is present.
NV-15-06-120	802	Faults, an NDOT ROW, and ERMA are present.
NV-15-06-121	2,577	Parcel is located on floodplains, a ROW is present, and ERMA is present.

NV-15-06-122	1,297	A monitoring well is present and ERMA is present.
NV-15-06-123	1,293	A ROW and ERMA are present.
NV-15-06-124	1,917	ERMA is present.
NV-15-06-125	975	A ROW and ERMA are present.
NV-15-06-126	2,514	ERMA present
NV-15-06-127	2,002	DBS occupied, raptor nest located, and ERMA is present.
NV-15-06-128	1,587	Parcel is located on floodplains, faults and range fence present, DBS occupied, and ERMA is present.
NV-15-06-129	2,495	Parcel is located on floodplains, springs present, 100K, a ROW and SS are present. It's DBS occupied, 5 raptor nests located, and ERMA is present.
NV-15-06-130	2,542	A ROW and ERMA are present, and it's DBS occupied.
NV-15-06-131	809	Faults are present, rec areas are present, SRMA and ERMA is present.
NV-15-06-134	1,929	Faults, ROW, and Rec areas are present. SRMA and ERMA is present.
NV-15-06-135	155	One raptor nest located and ERMA is present.
NV-15-06-143	1,908	A ROW and an active PoO are present. It's DBS occupied, and the area has really rough terrain.
NV-15-06-144	1,921	A ROW and SS are present, and it's DBS occupied.
NV-15-06-153	1,942	Range fencing and ERMA are present.
NV-15-06-154	1,948	Spring incumberance and ERMA is present.
NV-15-06-155	2,607	

		Parcel is located on floodplains. Faults, a ROW, and ERMA are present.
NV-15-06-156	2,325	Parcel is located on floodplains, 0-25 shallow groundwater, both wetlands, a ROW, and ERMA are present.
NV-15-06-157	1,302	Faults, disposal lands, and ERMA are present. Three raptor nests were located.
NV-15-06-158	1,793	Parcel is located on floodplains. Faults, disposal lands, and ERMA are present.
NV-15-06-159	1,751	Parcel is located on floodplains. Disposal lands and ERMA is present.
NV-15-06-160	2,466	This parcel was deferred the previous year. Covered in cultural. Disposal lands, NDOT gravel pit, and an active Plan of Operations (PoO) is present.
NV-15-06-161	776	This parcel was deferred the previous year. It is located on floodplains 0-25 shallow groundwater. It's covered in cultural. A ROW, geothermal, and an active PoO is present. There is a possibility for fish wildlife.

APPENDIX D
BATTLE MOUNTAIN DISTRICT
SPECIAL STATUS SPECIES LIST
BMDO Special Status Plant Species List

Common Name	Scientific Name	Status*
PLANTS		
Eastwood milkweed	*Asclepias eastwoodiana*	NS
Cima milkvetch	*Astragalus cimae* var. *cimae*	NS
Tonopah milkvetch	*Astragalus pseudiodanthus*	NS
Toquima milkvetch	*Astragalus toquimanus*	NS

Currant milkvetch	*Astragalus uncialis*	NS
Elko rockcress	*Boechera falcifructa*	NS
Monte Neva paintbrush	*Castilleja salsuginosa*	NS
Tecopa birdbeak	*Cordylanthus tecopensis*	NS
Goodrich biscuitroot	*Cymopterus goodrichii*	NS
Nevada willowherb	*Epilobium nevadense*	NS
Windloving buckwheat	*Eriogonum anemophilum*	NS
Beatley buckwheat	*Eriogonum beatleyae*	NS
Tiehm buckwheat	*Eriogonum tiehmii*	NS
Sand cholla	*Grusonia pulchella*	NS
Lunar Crater buckwheat	*Johanneshowellia crateriorum*	NS
Holmgren lupine	*Lupinus holmgrenianus*	NS
Low feverfew	*Parthenium ligulatum*	NS
Pahute Mesa beardtongue	*Penstemon pahutensis*	NS
Lahontan beardtongue	*Penstemon palmeri* var. *macranthus*	NS
Bashful beardtongue	*Penstemon pudicus*	NS
Tiehm beardtongue	*Penstemon tiehmii*	NS
Clarke phacelia	*Phacelia filiae*	NS
Williams combleaf	*Polyctenium williamsiae*	NS
Blaine pincushion	*Sclerocactus blainei*	NS
Tonopah pincushion	*Sclerocactus nyensis*	NS
Railroad Valley globemallow	*Sphaeralcea caespitosa* var. *williamsiae*	NS
Lone Mountain goldenhead	*Tonestus graniticus*	NS

***Status**

FE = Federal Endangered
FP = Federal Proposed Endangered
FT = Federal Threatened

FC = Federal Candidate
NS = Nevada BLM Sensitive Species

BMDO Special Status Wildlife Species List

Common Name	Scientific Name	Status*
BIRDS		
Northern goshawk	*Accipiter gentilis*	NS
Golden eagle	*Aquila chrysaetos*	NS
Burrowing owl	*Athene cunicularia*	NS
Ferruginous hawk	*Buteo regalis*	NS
Swainson's hawk	*Buteo swainsoni*	NS
Greater sage-grouse	*Centrocercus urophasianus*	FC, NS
Snowy plover	*Charadrius alexandrinus*	FT, NS
Yellow-billed cuckoo	*Coccyzus americanus*	FT,NS
Southwestern willow flycatcher	*Empidonax traillii extimus*	FE
Peregrine falcon	*Falco peregrinus*	NS
Pinyon jay	*Gymnorhinus cyanocephalus*	NS
Bald eagle	*Haliaeetus leucocephalus*	NS
Loggerhead shrike	*Lanius ludovicianus*	NS
Black rosy-finch	*Leucosticte atrata*	NS
Lewis' woodpecker	*Melanerpes lewis*	NS
Sage thrasher	*Oreoscoptes montanus*	NS
Brewer's sparrow	*Spizella breweri*	NS
FISH		
Railroad Valley springfish	*Crenichthys nevadae*	FT
Hot Creek Valley tui chub	*Gila bicolor ssp. 5*	NS
Railroad Valley tui chub	*Gila bicolor ssp. 7*	NS
Fish Lake Valley tui chub	*Gila bicolor ssp. 4*	NS
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	FT
Monitor Valley speckled dace	*Rhinichthys osculus ssp. 5*	NS
MAMMALS		
Pallid bat	*Antrozous pallidus*	NS
Pygmy rabbit	*Brachylagus idahoensis*	NS
Townsend's big-eared bat	*Corynorhinus townsendii*	NS
Big brown bat	*Eptesicus fuscus*	NS
Spotted bat	*Euderma maculatum*	NS
Silver-haired bat	*Lasionycteris noctivagans*	NS

Western red bat	*Lasiurus blossevillii*	NS
Hoary bat	*Lasiurus cinereus*	NS
Dark kangaroo mouse	*Microdipodops megacephalus*	NS
Pale kangaroo mouse	*Microdipodops pallidus*	NS
California myotis	*Myotis californicus*	NS
Western small-footed myotis	*Myotis ciliolabrum*	NS
Long-eared myotis	*Myotis evotis*	NS
Little brown myotis	*Myotis lucifugus*	NS
Fringed myotis	*Myotis thysanodes*	NS
Long-legged myotis	*Myotis volans*	NS
Western pipistrelle	*Pipistrellus hesperus*	NS
Pika	*Ochotona princeps*	NS
Bighorn sheep	*Ovis canadensis*	NS
Brazilian free-tailed bat	*Tadarida brasiliensis*	NS
Fish Spring pocket gopher	*Thomomys bottae abstrusus*	NS
San Antonio pocket gopher	*Thomomys bottae curatus*	NS
AMPHIBIANS		
Amargosa toad	*Anaxyrus nelsoni*	NS
Columbia spotted frog	*Rana luteiventris*	FC, NS
REPTILES		
Desert tortoise	*Gopherus agassizii*	FT, NS
INSECTS		
Crescent Dunes aegialian scarab	*Aegialia crescenta*	NS
Aegialian scarab beetle	*Aegialia knighti*	NS
Crescent Dunes aphodius scarab	*Aphodius sp. 2*	NS
Big Smoky wood nymph	*Cercyonis oetus alkalorum*	NS
White River wood nymph	*Cercyonis pegala pluvialis*	NS
White Mountains skipper	*Hesperia miriamae longaevicola*	NS
Railroad Valley skipper	*Hesperia uncas fulvapalla*	NS
White River valley skipper	*Hesperia uncas grandiosa*	NS
Great Basin small blue	*Philotiella speciosa septentrionalis*	NS
Crescent Dunes serican scarab	*Serica ammomenisco*	NS
Sand Mountain serican scarab	*Serica psammobunus*	NS
MOLLUSCS		
Southern duckwater pyrg	*Pyrgulopsis anatine*	NS
Large-gland carico pyrg	*Pyrgulopsis basiglans*	NS
Carinate duckwater pyrg	*Pyrgulopsis carinata*	NS
Dixie Valley pyrg	*Pyrgulopsis dixensis*	NS
Oasis Valley pyrg	*Pyrgulopsis micrococcus*	NS
Wong's pyrg	*Pyrgulopsis wongi*	NS

***Status**

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FC = Federal Candidate
FP = Federal Proposed Endangered
NS = Nevada BLM Sensitive Species
FT = Federal Threatened

BUREAU OF LAND MANAGEMENT
Nevada State Office

Appendix E

Hydraulic Fracturing White Paper

This White Paper on hydraulic fracturing is derived from the Hydraulic Fracturing White Paper (BLM 2013) written and developed by the Bureau of Land Management, Wyoming State Office. It has been modified to meet the criteria for the State of Nevada.

I. BACKGROUND

Hydraulic fracturing (HF) is a well stimulation process used to maximize the extraction of underground resources – oil, natural gas and geothermal energy. The HF process includes the acquisition of water, mixing of chemicals, production zone fracturing, and HF flowback disposal.

In the United States, HF has been used since the 1940's. Early on, the HF process utilized pressures that are of a much smaller magnitude than those used today.

The HF process involves the injection of a fracturing fluid and propping agent into the hydrocarbon bearing formation under sufficient pressure to further open existing fractures and/or create new fractures. This allows the hydrocarbons to more readily flow into the wellbore. HF has gained interest recently as hydrocarbons previously trapped in low permeability or "tight" sand and shale formations are now technically and economically recoverable. As a result, oil and gas production has increased significantly in the United States.

Prior to the development of HF in hydrocarbon bearing tight gas and shale formations, domestic production of conventional resources had been declining. In response to this decline, the federal government in the 1970's through 1992, passed tax credits to encourage the development of unconventional resources. It was during this time that the HF process was further advanced to include the high-pressure multi-stage HF operations being conducted today.

Generally, HF can be described as follows:

1. Water, proppant, and chemical additives are pumped at extremely high pressures down the wellbore.

2. The fracturing fluid is pumped through perforated sections of the wellbore and into the surrounding formation, creating fractures in the rock. The proppant holds the fractures open during well production.

3. Company personnel continuously monitor and gauge pressures, fluids and proppants, studying how the sand reacts when it hits the bottom of the wellbore, slowly increasing the density of sand to water as HF progresses.

4. This process may be repeated multiple times, in "stages" to reach maximum areas of the formation(s). The wellbore is temporarily plugged between each stage to maintain the highest fluid pressure possible and get maximum fracturing results in the rock.

5. The plugs are drilled or removed from the wellbore and the well is tested for results.

6. The pressure is reduced and the fracturing fluids are returned up the wellbore for disposal or treatment and re-use, leaving the sand in place to prop open the fractures and allow the oil/gas to flow.

II. OPERATIONAL ISSUES

Wells that undergo HF may be drilled vertically, horizontally, or directionally and the resultant fractures induced by HF can be vertical, horizontal, or both. Wells in Nevada (NV) may extend to depths Greater than 10,000 feet or less than 1,000 feet, and horizontal sections of a well may extend several thousand feet from the production pad on the surface. Prior to initiating HF, a cement bond log and pressure test is required and evaluated to ensure the integrity of the cement and its bond to both the well casing and the geologic formation.

The total volume of fracturing fluids is generally 95-99% water. The amount of water needed to fracture a well in NV depends on the geologic basin, the formation, and depth and type of well (vertical, horizontal, directional), and the proposed completion process.

In general, approximately 50,000 to 300,000 gallons may be used to fracture shallow vertical wells in NV, while approximately 800,000 to 10 million gallons may be used to fracture deep tight sand gas horizontal or directionally drilled wells in NV.

Proppant, consisting of synthetic or natural silica sand, may be used in quantities of a few hundred tons for a vertical well to a few thousand tons for a horizontal well.

Drilling muds, drilling fluids, water, proppant, and HF fluids are stored in onsite tanks or lined pits during the drilling and/or completion process. Equipment transport and setup can take several days, and the actual HF and flowback process can occur in a few days up to a few weeks. For oil wells, the flowback fluid from the HF operations is treated in an oil-water separator before it is stored in a lined pit or tank located on the surface. Where gas wells are flowed back using a "green completion process" fluids are run through a multi-phase separator, which are then piped directly to enclosed tanks or to a production unit. Nevada currently does not have large volumes of gas production, but this may change depending on the formation.

Gas emissions associated with the HF process are captured when the operator utilizes a green completion process. Where a green completion process is not utilized, gas associated with the well may be vented and/or flared until "saleable quality" product is obtained in accordance with

federal and state rules and regulations. The total volume of emissions from the equipment used (trucks, engines) will vary based on the pressures needed to fracture the well, and the number of zones to be fractured.

Under either completion process, wastewaters from HF may be disposed in several ways. For example, the flowback fluids may be stored in tanks pending reuse; the resultant waste may be re-injected using a permitted injection well, or the waste may be hauled to a licensed facility for treatment, disposal and/or reuse.

Disposal of the waste stream following establishment of "sale-quality" product, would be handled in accordance with Onshore Order #7 regulations and other State/Federal rules and regulations.

Fracturing Fluids

As indicated above, the fluid used in the HF process is approximately 95to 99 percent water and a small percentage of special-purpose chemical additives and proppant. There is a broad array of chemicals that can be used as additives in a fracture treatment including, but not limited to, hydrochloric acid, anti-bacterial agents, corrosion inhibitors, gelling agents (polymers), surfactants, and scale inhibitors. The 1 to 5 percent of chemical additives translates to a minimum of 5,000 gallons of chemicals for every 1.5 million gallons of water used to fracture a well (Paschke, Dr. Suzanne. USGS, Denver, Colorado. September 2011). Water used in the HF process is generally acquired from surface water or groundwater in the local area. Information on obtaining water and water rights is discussed below.

The Nevada Division of Minerals (NDOM) has regulations that require the reporting of the amount and type of chemicals used in a HF operation in "FracFocus" within 60 days of HF completion for public disclosure. For more information concerning FracFocus and HF, refer to the FracFocus website at www.fracfocus.org and the NDOM website at minerals.state.nv.us.

Re-Fracturing

Re-fracturing of wells (RHF) may be performed after a period of time to restore declining production rates. RHF success can be attributed to enlarging and reorienting existing fractures while restoring conductivity due to proppant degradation and fines plugging. Prior to RHF, the wellbore may be cleaned out. Cleaning out the wellbore may recover over 50% of the initial proppant sand. Once cleaned, the process of RHF is the same as the initial HF. The need for RHF cannot be predicted.

Water Availability and Consumption Estimates

According to the Nevada State Water Plan (March 1999), total statewide water withdrawals for NV are forecasted to increase about 9 percent from 4,041,000 acre-feet in 1995 to 4,391,000 acre-feet in 2020, assuming current levels of conservation. Approximately one-half of these withdrawals are consumptively used. This projected increase in water use is directly attributable to Nevada's increasing population and related increases in economic endeavors.

The anticipated rise in total statewide water withdrawals primarily reflects expected increases in public supply for M&I water usage to meet the needs of a growing urban population, with expanding commercial and industrial activities. Nevada's population is projected to reach about

3,047,000 by the year 2020, with about 95 percent of these residents served by public water systems (NDWP, March 1999).

M&I withdrawals currently account for about 13 percent of the water used in NV. Annual M&I water use is projected to increase from 525,000 af in 1995 to 1,034,000 af in 2020 (24 percent of total water withdrawals) based upon existing water use patterns and conservation measures. About 77 percent of water withdrawals are for agricultural use. Approximately 6 to 7 percent of statewide water withdrawals occur in the mining industry (NDWP, March 1999).

Interest in obtaining the necessary water supplies for wildlife and environmental needs is increasing. Additionally, the popularity of water-based outdoor recreation continues to grow. It is anticipated that these trends will continue, resulting in increased water supply demands for wildlife, environmental and recreational purposes.

Currently, surface water supplies are virtually fully appropriated. The increase in total statewide demand, particularly M&I water use, is expected to be met via better demand management (conservation), use of alternative sources (reused water, reclaimed water and greywater), purchases, leases or other transfers from existing water users, and by new groundwater appropriations. Much of the state's unappropriated groundwater is located in basins at a distance from urban centers. Thus, increasing attention will be placed on interbasin and intercounty transfers, and implementation of underutilized water management tools such as water marketing and water banking. Water for instream flow purposes, wildlife protection, environmental purposes and recreation will likely be generated by increased conservation and the acquisition of existing water rights (NDWP, March 1999).

Potential Sources of Water for Hydraulic Fracturing

Freshwater-quality water is required to drill the surface-casing section of the wellbore per Federal regulations; other sections of the wellbore (intermediate and/or production strings) would be drilled with appropriate quality makeup water as necessary. This is done to protect usable water zones from contamination, to prevent mixing of zones containing different water quality/use classifications, and to minimize total freshwater volumes. With detailed geologic well logging during drilling operations, geologists/mud loggers on location identify the bottoms of these usable water zones, which aids in the proper setting of casing depths.

Several sources of water are available for drilling and/or HF in NV. Because Nevada's water rights system is based in the prior appropriation doctrine, water cannot be diverted from a stream/reservoir or pumped out of the ground for drilling and/or HF without reconciling that diversion with the prior appropriation doctrine. Like any other water user, companies that drill or hydraulically fracture oil and gas wells must adhere to NV water laws when obtaining and using specific sources of water.

Below is a discussion of the sources of water that could potentially be used for HF. The decision to use any specific source is dependent on BLM authorization at the APD stage and the ability to satisfy the water appropriation doctrine. From an operators' standpoint, the decision regarding which water source will be used is primarily driven by the economics associated with procuring a specific water source.

Water transported from outside the state. The operator may transport water from outside the state. As long as the transport and use of the water carries no legal obligation to NV, this is an allowable source of water from a water rights perspective.

Irrigation water leased or purchased from a landowner. The landowner may have rights to surface water, delivered by a ditch or canal that is used to irrigate land. The operator may choose to enter into an agreement with the landowner to purchase or lease a portion of that water. This is allowable, however, in nearly every case; the use of an irrigation water right is likely limited to irrigation uses and cannot be used for well drilling and HF operations. To allow its use for drilling and HF, the owner of the water right and the operator must apply to change the water right through a formal process.

Treated water or raw water leased or purchased from a water provider. The operator may choose to enter into an agreement with a water provider to purchase or lease water from the water provider's system. Municipalities and other water providers may have a surplus of water in their system before it is treated (raw water) or after treatment that can be used for drilling and HF operations. Such an arrangement would be allowed only if the operator's use were compliant with the water provider's water rights.

Water treated at a waste water treatment plant leased or purchased from a water provider. The operator may choose to enter into an agreement with a water provider to purchase or lease water that has been used by the public, and then treated as wastewater. Municipalities and other water providers discharge their treated waste water into the streams where it becomes part of the public resource, ready to be appropriated once again in the priority system. But for many municipalities a portion of the water that is discharged has the character of being "reusable." As a result, it is possible that after having been discharged to the stream, it could be diverted by the operator to be used for drilling and HF operations. Such an arrangement would only be appropriate with the approval of the Nevada Department of Environmental Protection, State Engineer's Office (NDEP) and would be allowed only if the water provider's water rights include uses for drilling and HF operations.

New diversion of surface water flowing in streams and rivers. New diversion of surface waters in most parts of the state are rare because the surface streams are already "over appropriated," that is, the flows do not reliably occur in such a magnitude that all of the vested water rights on those streams can be satisfied. Therefore, the only time that an operator may be able to divert water directly from a river is during periods of high flow and less demand. These periods do occur but not reliably or predictably.

Produced Water. The operator may choose to use water produced in conjunction with oil or gas production at an existing oil or gas well. The water that is produced from an oil or gas well is under the administrative purview of the NDEP, Underground Injection Control Program (UIC) and is either non-tributary, in which case, it is administered independent of the prior appropriation doctrine; or is tributary, in which case, the depletions from its withdrawal must be fully augmented if the depletions occur in an over-appropriated basin. The result in either case is that the produced water is available for consumption for other purposes, not just oil and gas

operations. The water must not be encumbered by other needs and the operator must obtain a proper well permit from the NDEP before the water can be used for drilling and HF operations.

Reused or Recycled Drilling Water. Water that is used for drilling of one well may be recovered and reused in the construction of subsequent wells. The BLM encourages reuse and recycling of both the water used in well drilling and the water produced in conjunction with oil or gas production. However, as described above, the operator must obtain the right to use the water for this purpose.

On-Location Water Supply Wells. Operators may apply for, and receive, permission from the NDEP to drill and use a new water supply well. These wells are usually drilled on location to provide an on-demand supply. These industrial-type water supply wells are typically drilled deeper than nearby domestic and/or stock wells to minimize drawdown interference, and have large capacity pumps. The proper construction, operation and maintenance, backflow prevention and security of these water supply wells are critical considerations at the time they are proposed to minimize impacts to the well and/or the waters in the well and are under the jurisdiction of the NDEP. Plugging these wells is under the jurisdiction of the NDEP and BLM.

III. Potential Impacts to Usable Water Zones

Impacts to freshwater supplies can originate from point sources, such as chemical spills, chemical storage tanks (aboveground and underground), industrial sites, landfills, household septic tanks, and mining activities. Impacts to usable waters may also occur through a variety of oil and gas operational sources which may include, but are not limited to, pipeline and well casing failure, and well (gas, oil and/or water) drilling and construction of related facilities. Similarly, improper construction and management of open fluids pits and production facilities could degrade ground water quality through leakage and leaching.

Should hydrocarbons or associated chemicals for oil and gas development, including HF, exceeding US Environmental Protection Agency (EPA)/NDEP standards for minimum concentration levels migrate into potable water supply wells, springs, or usable water systems, it could result in these water sources becoming non-potable. Water wells developed for oil and gas drilling could also result in a draw down in the quantity of water in nearby residential areas depending upon the geology; however it is not currently possible to predict whether or not such water wells would be developed.

Usable groundwater aquifers are most susceptible to pollution where the aquifer is shallow (within 100 feet of the surface depending on surface geology) or perched, are very permeable, or connected directly to a surface water system, such as through floodplains and/or alluvial valleys or where operations occur in geologic zones which are highly fractured and/or lack a sealing formation between the production zone and the usable water zones. If an impact to usable waters were to occur, a Greater number of people could be affected in densely populated areas versus sparsely populated areas characteristic of NV.

Potential impacts on usable groundwater resources from fluid mineral extraction activities can result from the five following scenarios:

1. Contamination of aquifers through the introduction of drilling and/or completion fluids through spills or drilling problems such as lost circulation zones.

2. Communication of the induced hydraulic fractures with existing fractures potentially allows for HF fluid migration into usable water zones/supplies. The potential for this impact is likely dependent on the local hydraulic gradients where those fluids are dissolved in the water column.

3. Cross-contamination of aquifers/formations may result when fluids from a deeper aquifer/formation migrate into a shallower aquifer/formation due to improperly cemented well casings.

4. Localized depletion of perched aquifer or drawdown of unconfined groundwater aquifer.

5. Progressive contamination of deep confined, shallow confined, and unconfined aquifers if the deep confined aquifers are not completely cased off, and geologically isolated, from deeper oil bearing units. An example of this would be salt water intrusion resulting from sustained drawdown associated with the pumping of groundwater.

The impacts above could occur as a result of the following processes:

Improper casing and cementing.
A well casing design that is not set at the proper depths or a cementing program that does not properly isolate necessary formations could allow oil, gas or HF fluids to contaminate other aquifers/formations.

Natural fractures, faults, and abandoned wells.
If HF of oil and gas wells result in new fractures connecting with established natural fractures, faults, or improperly plugged dry or abandoned wells, a pathway for gas or contaminants to migrate underground may be created posing a risk to water quality. The potential for this impact is currently unknown but it is generally accepted that the potential decreases with increasing distance between the production zone and usable water zones. This potential again is dependent upon the site specific conditions at the well location.

Fracture growth.
A number of studies and publications report that the risk of induced fractures extending out of the target formation into an aquifer—allowing hydrocarbons or other fluids to contaminate the aquifer —may depend, in part, on the formation thickness separating the targeted fractured formation and the aquifer. For example, according to a 2012 Bipartisan Policy Center report, the fracturing process itself is unlikely to directly affect freshwater aquifers because fracturing typically takes place at a depth of 6,000 to 10,000 feet, while drinking water aquifers are typically less than 1,000 feet deep. Fractures created during HF have not been shown to span the distance between the targeted oil formation and freshwater bearing zones. If a parcel is sold and development is proposed in usable water zones, those operations would have to comply with federal and/or state water quality standards or receive a Class II designation from the NDEP.

Fracture growth and the potential for upward fluid migration, through volcanic, sedimentary and other geologic formations depend on site-specific factors such as the following:

1. Physical properties, types, thicknesses, and depths of the targeted formation as well as those of the overlying geologic formations.

2. Presence of existing natural fracture systems and their orientation in the target formation and surrounding formations.

3. Amount and distribution of stress (i.e., in-situ stress), and the stress contrasts between the targeted formation and the surrounding formations.

Hydraulic fracture stimulation designs include the volume of fracturing fluid injected into the formation as well as the fluid injection rate and fluid viscosity; this information would be evaluated against the above site specific considerations.

Fluid leak and recovery (flowback) of HF fluids.

Not all fracturing fluids injected into the formation during the HF process may be recovered at the surface. Fluid movement into smaller fractures or other geologic substructures can be to a point where flowback efforts will not recover all the fluid or that the pressure reduction caused by pumping during subsequent production operations may not be sufficient to recover all the fluid that has leaked into the formation. It is noted that the fluid loss due to leakage into small fractures and pores is minimized by the use of cross-linked gels.

Willberg et al. (1998) analyzed HF flowback and described the effect of pumping rates on cleanup efficiency in initially dry, very low permeability (0.001 millidarcy) shale. Some wells in this study were pumped at low flowback rates (less than 3 barrels per minute (bbl/min). Other wells were pumped more aggressively at Greater than 3 bbl/min. Thirty-one percent of the injected HF fluids were recovered when low flowback rates were applied over a 5-day period. Forty-six percent of the fluids were recovered when aggressive flowback rates were applied in other wells over a 2-day period. In both cases, additional fluid recovery (10 percent to 13 percent) was achieved during the subsequent gas production phase, resulting in a total recovery rate of 41 percent to 59 percent of the initial volume of injected HF fluid. Ultimate recovery rate however, is dependent on the permeability of the rocks, fracture configuration, and the surface area of the fracture(s).

The ability of HF chemicals to migrate in an undissolved or dissolved phase into a usable water zone is likely dependent upon the location of the sealing formation (if any), the geology of the sealing formation, hydraulic gradients and production pressures.

HF fluids can remain in the subsurface unrecovered, due to “leak off” into connected fractures and the pores of rocks. Fracturing fluids injected into the primary hydraulically induced fracture can intersect and flow (leak off) into preexisting smaller natural fractures. Some of the fluids lost in this way may occur very close to the well bore after traveling minimal distances in the hydraulically induced fracture before being diverted into other fractures and pores. Once “mixed” with the native water, local and regional vertical and horizontal gradients may influence

where and if these fluids will come in contact with usable water zones, assuming that there is inadequate recovery either through the initial flowback or over the productive life of the well. Faults, folds, joints, etc., could also alter localized flow patterns as discussed below.

The following processes can influence effective recovery of the fracture fluids:

Check-Valve Effect
A check-valve effect occurs when natural and/or newly created fractures open and HF fluid is forced into the fractures when fracturing pressures are high, but the fluids are subsequently prevented from flowing back toward the wellbore as the fractures close when the fracturing pressure is decreased (Warpinski et al., 1988; Palmer et al., 1991a).

A long fracture can be pinched-off at some distance from the wellbore. This reduces the effective fracture length. HF fluids trapped beyond the "pinch point" are unlikely to be recovered during flowback and oil/gas is unlikely to be recovered during production.

In most cases, when the fracturing pressure is reduced, the fracture closes in response to natural subsurface compressive stresses. Because the primary purpose of HF is to increase the effective permeability of the target formation and connect new or widened fractures to the wellbore, a closed fracture is of little use. Therefore, a component of HF is to "prop" the fracture open, so that the enhanced permeability from the pressure-induced fracturing persists even after fracturing pressure is terminated. To this end, operators use a system of fluids and "proppants" to create and preserve a high-permeability fracture-channel from the wellbore deep into the formation.

The check-valve effect takes place in locations beyond the zone where proppants have been placed (or in smaller secondary fractures that have not received any proppant). It is possible that some volume of stimulation fluid cannot be recovered due to its movement into zones that were not completely "propped" open.

Adsorption and Chemical Reactions
Adsorption and chemical reactions can also prevent HF fluids from being recovered. Adsorption is the process by which fluid constituents adhere to a solid surface and are thereby unavailable to flow with groundwater. Adsorption to coal is likely; however, adsorption to other geologic material (e.g., shale, sandstone) is likely to be minimal. Another possible reaction affecting the recovery of fracturing fluid constituents is the neutralization of acids (in the fracturing fluids) by carbonates in the subsurface.

Movement of Fluids outside the Capture Zone
Fracturing fluids injected into the target zone flow into fractures under very high pressure. The hydraulic gradients driving fluid flow away from the wellbore during injection are much Greater than the hydraulic gradients pulling fluid flow back toward the wellbore during flowback and production (pumping) of the well. Some portion of the fracturing fluids could be forced along the hydraulically induced fracture to a point beyond the capture zone of the production well. The size of the capture zone will be affected by the regional groundwater gradients, and by the drawdown caused by producing the well. Site-specific geologic, hydrogeologic, injection pressure, and production pumping details should provide the information needed to estimate the

dimension of the production well capture zone and the extent to which the fracturing fluids might disperse and dilute.

Incomplete Mixing of Fracturing Fluids with Water

Steidl (1993) documented the occurrence of a gelling agent that did not dissolve completely and actually formed clumps at 15 times the injected concentration in an induced fracture. Steidl also directly observed gel hanging in stringy clumps in many other induced fractures. As Willberg et al. (1997) noted, laboratory studies indicate that fingered flow of water past residual gel may impede fluid recovery. Therefore, some fracturing fluid gels appear not to flow with groundwater during production pumping and remain in the subsurface unrecovered. Such gels are unlikely to flow with groundwater during production, but may present a source of gel constituents to flowing groundwater during and after production.

Authorization of any future proposed projects would require full compliance with local, state, and federal regulations and laws that relate to surface and groundwater protection and would be subject to routine inspections by the BLM and the State of Nevada Commission on Mineral Resources, Division of Minerals Memorandum of Understanding dated January 9, 2006, prior to approval.

IV. Geologic Hazards (including seismic/landslides)

Nevada is the 3rd most tectonically active state in the union. Since the 1850s there have been 63 earthquakes with a magnitude Greater than 5.5, the cutoff for a destructive earthquake. Potential geologic hazards caused by HF include induced seismic activity in addition to the tectonic activity already occurring in the state. Induced seismic activity could indirectly cause a surficial landslide where soils/slopes are susceptible to failure. Landslides involve the mass movement of earth materials down slopes and can include debris flows, soil creep, and slumping of large blocks of material. Any destructive earthquake also has the potential to induce liquefaction in saturated soils.

Earthquakes occur when energy is released due to blocks of the earth's crust moving along areas of weakness or faults. Earthquakes attributable to human activities are called "induced seismic events" or "induced earthquakes." In the past several years induced seismic events related to energy development projects have drawn heightened public attention. Although only a very small fraction of injection and extraction activities at hundreds of thousands of energy development sites in the United States have induced seismicity at levels that are noticeable to the public, seismic events caused by or likely related to energy development have been measured and felt in Alabama, Arkansas, California, Colorado, Illinois, Louisiana, Mississippi, Nebraska, Nevada, New Mexico, Ohio, Oklahoma, and Texas.

A study conducted by the National Academy of Sciences (Induced Seismicity Potential in Energy Technologies, National Academy of Sciences, 2012) studied the issue of induced seismic activity from energy development. As a result of the study, they found that:

1. The process of hydraulic fracturing a well as presently implemented for shale gas recovery does not pose a high risk for inducing felt seismic events; and

2. Injection for disposal of waste water derived from energy technologies into the subsurface does pose some risk for induced seismicity, but very few events have been documented over the past several decades relative to the large number of disposal wells in operation.

The potential for induced seismicity cannot be made at the leasing stage; as such, it will be evaluated at the APD stage should the parcel be sold/issued, and a development proposal submitted.

V. Spill Response and Reporting

Spill Prevention, Control, and Countermeasure (SPCC) Plans – EPA's rules include requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. The rule requires that operators of specific facilities prepare, amend, and implement SPCC Plans. The SPCC rule is part of the Oil Pollution Prevention regulation, which also includes the Facility Response Plan (FRP) rule. Originally published in 1973 under the authority of §311 of the Clean Water Act, the Oil Pollution Prevention regulation sets forth requirements for prevention of, preparedness for, and response to oil discharges at specific non-transportation-related facilities. To prevent oil from reaching navigable waters and adjoining shorelines, and to contain discharges of oil, the regulation requires the operator of these facilities to develop and implement SPCC Plans and establishes procedures, methods, and equipment requirements (Subparts A, B, and C). In 1990, the Oil Pollution Act amended the Clean Water Act to require some oil storage facilities to prepare FRPs. On July 1, 1994, EPA finalized the revisions that direct facility owners or operators to prepare and submit plans for responding to a worst-case discharge of oil.

In addition to EPA's requirements, operators must provide a plan for managing waste materials, and for the safe containment of hazardous materials, per Onshore Order #1 with their APD proposal. All spills and/or undesirable events are managed in accordance with Notice to Lessee (NTL) 3-A for responding to all spills and/or undesirable events related to HF operations.

Certain oil and gas exploration and production wastes occurring at or near wellheads are exempt from the Clean Water Act, such as: drilling fluids, produced water, drill cuttings, well completion, and treatment and stimulations fluids. In general, the exempt status of exploration and production waste depends on how the material was used or generated as waste, not necessarily whether the material is hazardous or toxic.

VI. Public Health and Safety

The intensity, and likelihood, of potential impacts to public health and safety, and to the quality of usable water aquifers is directly related to proximity of the proposed action to domestic and/or community water supplies (wells, reservoirs, lakes, rivers, etc.) and/or agricultural developments. The potential impacts are also dependent on the extent of the production well's capture zone and well integrity. Nevada's Standard Lease Stipulations and Lease Notices specify that oil and gas

development is generally restricted within 500 feet of riparian habitats and wetlands, perennial water sources (rivers, springs, water wells, etc.) and/or floodplains. Intensity of impact is likely dependent on the density of development.

VII. References

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